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THESIS

RECOMMENDATIONS TO COMMANDER, NAVAL SURFACE FORCES, FOR ACHIEVING A STRATEGIC APPROACH TO THE ACQUISITION OF INFORMATION SYSTEMS AND SERVICES

by

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September 2010

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Historically, Commander, Naval Surface Forces (CNSF), has awarded multiple service contracts ranging between $7 million to $8 million dollars, which have resulted in outflow of funds to maintain disparate systems that produce non-integrated data structures. The command requires a method to maintain or improve their capability while reducing their operating costs. The contracts meet CNSF major automaton needs for training, Websites, and reporting tools. However, CNSF desires an enterprise level integration plan for acquiring information systems (IS), and an architecture plan that will align all systems and metrics. This change will increase efficiency, reduce redundancy, and establish an enterprise framework. CNSF traditional decision making has resulted in several disparate programs that require separate contracts and limited integration. This structure has fueled excessive service fees, stovepipe systems, and the organization is stuck paying to maintain the operation. This study will assist in identifying the current traditional behaviors and introduce a more strategic approach to decision making. Additionally, our goal is to evolve the current IS acquisition decision making from its current state to one of a more strategic-based concept The focus of this thesis is on reengineering the CNSF decision-making process for acquiring IS capabilities.

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ABSTRACT

Historically, Commander, Naval Surface Forces (CNSF), has awarded multiple service contracts ranging between $7 million to $8 million, which have resulted in outflow of funds to maintain disparate systems that produce nonintegrated data structures. The command requires a method to maintain or improve its capability while reducing its operating costs. The contracts meet CNSF major automaton needs for training, Websites, and reporting tools. However, CNSF desires an enterprise level integration plan for acquiring information systems (IS), and an architecture plan that will align all systems and metrics. This change will increase efficiency, reduce redundancy, and establish an enterprise framework. CNSF traditional decision making has resulted in several disparate programs that require separate contracts and limited integration. This structure has fueled excessive service fees and stovepipe systems, and the organization is stuck paying to maintain the operation. This study will assist in identifying the current traditional behaviors and introduce a more strategic approach to decision making. Additionally, our goal is to evolve the current IS acquisition decision making from its current state to one of a more strategic-based concept. The focus of this thesis is on re-engineering the CNSF decision-making process for acquiring IS capabilities.

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LIST OF ACRONYMS AND ABBREVIATIONS

AS	Acquisition Strategy
ASC	Acquisition Strategy Characteristics
BMA	Business Mission Areas
AT&L	Acquisition Technology And Logistics
CAIV	Cost As An Independent Variable
CMAB	Commodity Managers Advisory Board
CMP	Continuous Monitoring Program
CNAF	Commander, Naval Air Forces
CNSF	Commander, Naval Surface Forces
CNSL	Commander, Naval Surface Forces Atlantic
CNSP	Commander, Naval Surface Forces Pacific
COCOM	Combatant Commander
CV SHARP	Carrier Sierra Hotel Aviation Readiness Program
DoD	Department Of Defense
DRRS-N	Defense Readiness Reporting System-Navy
EA	Enterprise Architecture
EAS	Evolutionary Acquisition Strategy
FHP	Flight Hours Program
FRE	Fleet Readiness Enterprise
GAO	government Accountability Office
IOC	Initial Operating Capability

IS	Information System(s)
ISIC	Immediate Superior In Charge
IT	Information Technology
MDA	Milestone Decision Authority
MILDEP	Military Department
MOSA	Modular Open Systems Approach
NAE	Naval Aviation Enterprise
PLA	Product Line Acquisition
PBSA	Performance Based Services Acquisition
SHARP	Sierra Hotel Aviation Readiness Program
SOW	Statement Of Work
SURFORWEB	Surface Forces Web
SWE	Surface Warfare Enterprise
TORIS	Training And Operational Readiness Information Service

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I. INTRODUCTION

A. ACQUISITION STRATEGY FOR PROCUREMENT OF INFORMATION SYSTEMS AND SERVICES TO MEET A PRESCRIBED IS STRATEGY

Information Systems (IS) provide vital enhancement to the mission capability of both operational and supporting commands within the DoD. As the mission requirements of these commands evolve, their IS needs also change. The dilemma for these commands, their Military Departments (MILDEPS), and the DoD is the acquisition of IS that leverage newer dynamic technologies. These systems must meet both mission and strategic IS goals, and fit within the Department's vision of an enterprise architecture framework.

Over the last decade, services have become increasingly reliant upon IS, resulting in greater scrutiny on the acquisition process. The Clinger-Cohen Act of 1996 provides the documented framework that catalyzed review and reassessment of the government's acquisition process as it relates to IS. The document sets forth requirements that should be met to achieve "maximizing the value and managing the risks of IS acquisitions (Clinger, 1996)." In order to meet these goals, a strategic approach to the acquisition of IT is necessary. The Acquisition Strategy Guide states: "An acquisition strategy achieves program objectives using a technical management approach. It is a framework for achieving core objectives of a program." The guide provides a roadmap for meeting the goals of the Clinger-Cohen Act.

B. BACKGROUND

Historically, CNSF has awarded multiple IS service contracts ranging between $7 million and $8 million, which have resulted in outflow of funds to maintain disparate systems that produce non-integrated data structures. The command requires a method to maintain or improve their capability while reducing their operating costs. The contracts meet CNSF major automaton needs for training, Web sites, and reporting tools. However, CNSF desires an enterprise level integration plan for acquiring IT systems, and an architecture plan that will align all systems and metrics. This change will increase efficiency, reduce redundancy, and establish an enterprise framework.

CNSF traditional decision making has led to disjointed programs that require separate contracts. This structure has fueled excessive service fees, stovepipe systems, and the organization is stuck paying to maintain the operation. This study will help identify the current traditional behaviors and introduce a more strategic approach to decision making. Additionally, our goal is to evolve the current acquisition plan from its current state to one of a more strategic-based concept (Commander, Naval Surface Forces, 2005).

The focus of this thesis is on reengineering the Commander, Naval Surface Forces (CNSF) decision-making process for acquiring IS capabilities. This process warrants reengineering in order for it to become compliant with DODI 5000.02, which advocates an enterprise-wide approach for both planning and execution of IS acquisition (DODI 5000.02, 2008)

These systems support the administrative mission of the U.S. Navy Commander and the fleet of assets it supports. The fleet has become completely reliant upon information systems for administrative control. Their criticality to the evolving missions of the Navy requires an acquisition process that can provide system integration, rapid fielding, and enterprise scalability.

C. RESEARCH QUESTIONS

The following research questions were formulated to assist in developing a strategic acquisition process to procure information systems and meet CNSF strategic IS requirements.

1. Primary Question

> Which Strategic Approach to IS acquisitions broadly supports both CNSF missions and business practices?

2. Secondary Questions

> What are the different IS Acquisition approaches?

What types of IS Acquisition approaches do other organizations with a similar structure use?

How do similar organizations measure ROI in their acquisition programs?

D. POTENTIAL BENEFITS

This thesis is an externally sponsored project for CNSF. It is the third part of an overall three-part project. CNSF has coordinated with three sets of students to provide the following:

1) Assessment of contracting measures

2) Enterprise IS strategy

3) Enterprise plan for acquiring service contracts

This thesis provides recommendations for IS acquisition. It will feed into the development of an IS acquisition strategy, based on the recommended IS Strategy from Group two in the project. It will also provide a means for establishing and controlling IS capabilities with minimum impact on the organizational structure.

E. METHODOLOGY

The research methodology for thesis entailed data collection, examination and analysis from policy and guidance documentation from DoD and DON. Additionally, theoretical and commercial acquisition strategies were examined analysis and relevance. Findings from the preceding groups involved in this project was reviewed and referenced to identify basic requirements and baseline spending on IS strategies. Discussion via e-mail and telephone were utilized gather information about CNSF current IS acquisition processes. Conclusions were drawn and recommendations were provided to CNSF as to an appropriate acquisition strategy to meet current and future IS needs.

F. ORGANIZATION OF STUDY

Chapter II Overview of Current Acquisition Strategies

Chapter II will include academic review of current government and commercial acquisition requirements and strategies that have been commonly used are widely successful. The research will concentrate on how these strategies can assist CNSF in achieving successful IS acquisitions, and identify shortfalls in CNSF current acquisitions process. The literature review will focus primarily on acquisition strategies and acquisition management advantages to improve CNSF current and future IS acquisition programs.

Chapter III Background of Commander, Naval Surface Forces (CNSF), Organization and Approach to IS Acquisition

This chapter will examine CNSF acquisition processes and determine advantages and disadvantages of their current methods used in developing Surface Warfare Enterprise (SWE) applications. We will provide history and background of the CNSF organization, the SWE and Commander, Naval Air Forces (CNAF). The background information discussed will be used to compare and contrast organizational norms and behaviors with CNAF and similar commercial organizations in order to identify advantages and disadvantages of CNSF processes. We conducted interviews with contracting and development staff personnel to determine the acquisition roadmap used by CNSF to include research, development, contracting, and procurement of the SWE applications from requirements to delivery.

Chapters IV and V Analysis, Conclusions and Recommendations

After acquisition strategies have been examined and analyzed, and CNSF acquisition processes have been reviewed recommendations will be made for a more robust and effective acquisition strategy for developing systems that will meet strategic IS requirements and fit within the enterprise needs of the CNSF. Chapter IV will highlight solutions to mitigate the disadvantages of CNSF current acquisition processes discussed in chapter three and explain recommendations for successful execution of an acquisition strategy that will be more suitable for CNSF business process and IS needs. Chapter five will summarize this research and conclusions, and give recommendations for future work.

II. A STRATEGIC APPROACH TO SYSTEM ACQUISITION

A. DEFINITION OF ACQUISITION STRATEGY

An acquisition strategy (AS) achieves program objectives using a technical management approach. It is a framework for achieving core objectives of a program, which are: planning, organizing, staffing, controlling, and leading a program (Acquisition Strategy Guide, 2005). Strategically approaching the acquisition process organizes priorities that meet specific business objectives and Information System (IS) requirements. An effective strategy balances cost and effectiveness through the following measures: development of technological options, exploration of design concepts, and acquisition activities (Acquisition Strategy Guide, 2005). An AS is of great importance to those organizations that primarily acquire rather than develop, this practice area is especially important for U.S. government agencies, such as the U.S. Department of Defense (DoD) (SEI, 2010). DoD Instruction 5000.02 mandates the inclusion of an AS in the acquisition. The Program Manager (PM) shall prepare, and the Milestone Decision Authority (MDA) shall approve an Acquisition Strategy to guide activity during Engineering Manufacturing and Development (EMD).

The AS shall describe how the PM plans to employ contract incentives to achieve required cost, schedule, and performance outcomes (Department of Defense, 2008). Figure 1, from the Acquisition Strategy Guide, displays the milestones and decision points that are integral to the acquisition process.

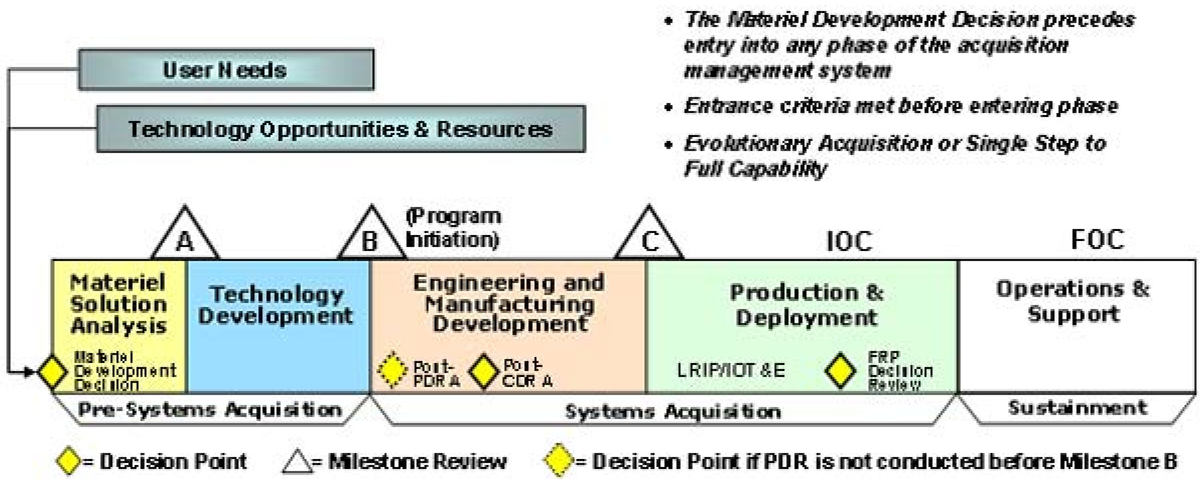

Figure 1. Defense Acquisition System with milestones and decision points (From Defense Acquisition University, 2003)

B. ELEMENTS IN ACQUISITION STRATEGY DEVELOPMENT

An effective acquisition strategy is a key requirement of both system procurement and overall acquisition. A primary goal in developing an acquisition strategy is the minimization of the time and cost of satisfying an identified, validated need consistent with common sense and sound business practices (Defense Acquisition University, 2003). It should cover system initial development through end-of-life system disposal. The effectiveness of an AS is based upon five characteristics known as Acquisition Strategy Characteristics (ASC), which are:

- Realism
- Stability
- Resource balance
- Flexibility
- Managed risk

1. Acquisition Strategy Characteristics (ASC)

These characteristics assist in giving the AS credibility and facilitate buy-in of key stakeholders and decision makers. The goals of any acquisition must be realistic and attainable, and that milestones can be achieved within the allotted timeframe of the program. Acquisition stability is the characteristic that inhibits negative external or internal influences from seriously disrupting program progress (Defense Systems Management College, 1999). Changes in cost, resources, timeline, etc., can have far reaching effects into the overall acquisition of a system.

The greater the stability of a program, the more likely it is to withstand these effects and remain on target, and below estimated cost. Changes in requirements, funding, personnel or organization can all negatively impact acquisition stability and result in program disruption. However, a sense of purpose, top-level support, and firm commitment can contribute to a program's overall stability and resistance to the aforementioned influences.

Resource balance is a condition of equilibrium between and within major program objectives that are competing for resources. The achievement of cost, schedule, and performance requirements uses resources of time, people, facilities, and money—all of which are limited (Defense Systems Management College, 1999). Competition for funding is one of the biggest influences affecting programs. As a resource, adequate funding is vital to the survival and implementation of any acquisition. Issues with resource balance most commonly occur when there is a conflict between user requirements and funding constraints. To meet congressional intent to control costs, the Program Manager (PM) is forced to balance the user's desire for the system that will best perform and meet his needs, and the desire of the organizational Comptroller to keep spending at or below budget constraints.

Flexibility is a characteristic of the acquisition strategy related to the ease with which changes can be accommodated without significant changes in resource requirements (Defense Systems Management College, 1999). An acquisition strategy must allow for changes in requirements, funding, contracts, and design, in order facilitate program growth and development, satisfy funding constraints and best meet user needs. Flexibility is possibly the most important AS characteristic. Flexibility must be built into every aspect of the AS.

The acquisition of any program will encounter uncertainty. These uncertainties represent risk, which could negatively impact the overall acquisition. Managing this risk is necessary throughout the acquisition process and should be included in the AS. Risk management is concerned with the identification, assessment, mitigation, and handling of uncertainties that threaten cost, schedule, and performance objectives (Defense Acquisition University, 2003). The AS must address the dynamic sources of risk associated with any program. Therefore, the AS must be continually monitored and updated to address changes and mitigate risks.

2. Key Items for an Acquisition Strategy

In order to mitigate risk and provide for greater stability within the AS, funding sources and goals must be outlined and considered. The strategy should discuss how the funding lines will affect the chosen acquisition approach, either (i.e., evolutionary, single-step). The issue of cost is a common issue that budgeting professionals must tackle in the decision to acquire new systems. Program costs must be adequately estimated, and aggressively managed to ensure that system performance is met, and costs do not exceed funding constraints. The Concept of Cost As an Independent Variable (CAIV) should be used in the acquisition strategy as a means of address[ing] methodologies to acquire and operate affordable DoD systems by setting aggressive, achievable cost objectives and managing achievement of these objectives (Defense Systems Management College, 1999).

a. Cost as an Independent Variable (CAIV)

Cost as an Independent Variable integrates best practices shown to be effective within the commercial sector with government acquisition initiatives in order to provide DoD entities with superior war fighting assets and capabilities. It is executed by utilizing the three measures by which a program's success is often measured, which are: cost, schedule, and system performance. Under this concept, performance and schedule are allowed to vary within the program while cost is held as independent. Once the required capability and design have been agreed upon, a cost constraint is formulated and the system is then constrained by this cost and the capability is the overall end state. CAIV should be instituted early in the acquisition process. It is important to note that this cost is considered over the lifecycle of the system, and incorporates total cost ownership. CAIV is an acquisition philosophy that emphasizes keeping system life cycle cost within an established range by trading the other system acquisition variables of performance or schedule (Defense Acquisition University, 2010).

An example of CAIV is the Abrams Tank. The Army is considering a replacement for the Abrams tank. Traditional cost analysis would indicate that the cost of the new tank (development, production, sustainment) would be a function or other variables, such as the tank's combat weight, armament, speed, survivability, maintainability, etc. In other words, Cost = f (weight, armament...). Therefore, cost depends on the set levels of the other variables. CAIV reverses this role. Cost is independently set to some budgeted value, and a determination is made on how much performance can be derived from that cost (Defense Acquisition University, 2010).

C. DESCRIPTION OF STRATEGIC ACQUISITION APPROACHES

There are several acquisition strategies for the various goods and/or services that must be procured to meet operational objectives. It is important to design a strategy that best fits the organization's business needs, processes, culture, needs of the project and environment. A good acquisition strategy is realistically tailored to program objectives and constraints, and is flexible enough to allow innovation and modification as the program evolves (Guide, 2005). In the case of Information Systems (IS), the process must be agile and flexible enough to rapidly deliver meaningful incremental capability (Defense Science Board, 2008). A clear, credible acquisition strategy contains the following characteristics: realism, stability, resource balance, flexibility, and managed risk (Guide 2005). These characteristics aid in meeting the objectives of the strategy. Some acquisition strategies are:

- Evolutionary Acquisition
- Product Line Acquisition
- Performance-Based Acquisition

1. Evolutionary Acquisition Strategy (EAS)

According to ACQuipedia, EAS is defined as the preferred DoD strategy for rapid acquisition of mature technology that delivers capability in militarily useful increments with a recognized need for upfront future capability improvements. The increments or steps used in EAS help to refine already well-defined requirements. Each EA program increment is treated in theory as if it were a separate program with its own unique developmental and procurement phases.

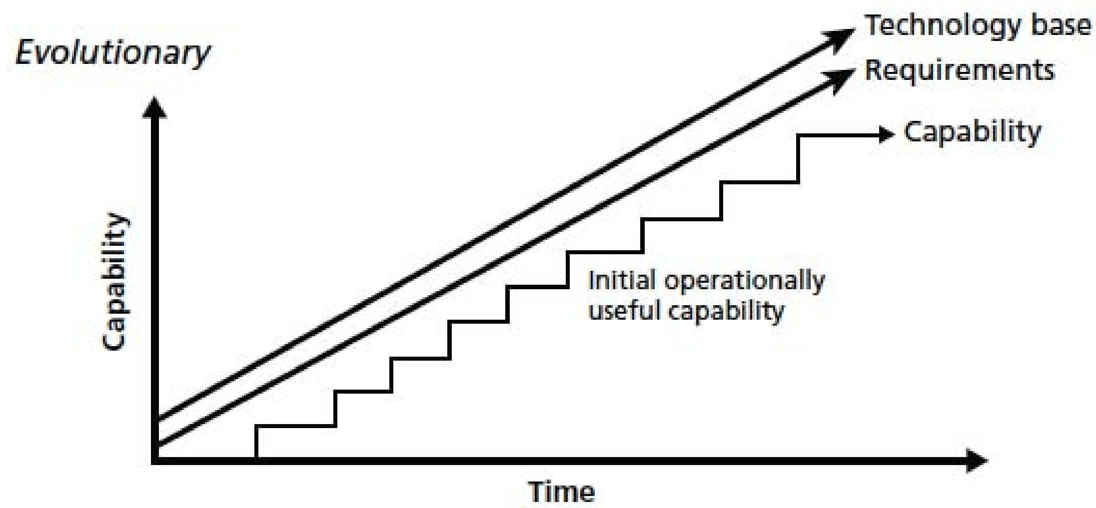

Figure 2. Evolutionary Acquisition capability gained with reference to time (From Defense Acquisition University, 2003)

A series of less demanding, phased capability steps are identified and the available technologies are matched with more realistic requirements and capability expectations over time, which results in multiple steps of increasing capability available much sooner to the war fighter (RAND 2002). Figure 2 displays the relationship between time and capability in the EAS process. Requirements become more refined, while capability and technology increase with each iteration. An evolutionary approach to acquisition requires considerable interaction between users and developers. In the EAS, development is executed incrementally.

a. Spiral Development

Under spiral development the desired capability or mission need is identified at the outset, but the ultimate state of the system is still unknown. This type of development incrementally delivers the user the most capable iteration to meet refined requirements. Technology maturation and user feedback recursively effect future increments delivered through form of development. Spiral development is no longer used within the DoD. However, the explanation provided here is relative to a researched system that will be introduced and discussed in later chapters.

b. Incremental Development

In incremental development, a desired capability is identified, an end-state requirement is known, and that requirement is met over time by development of several increments, each dependent on available mature technology (Defense Acquisition University, 2003). EAS is a widely used method for acquiring systems. It is commonly used in the acquisition of large weapon systems that must be fielded rapidly to meet operational needs. Often, the end-state of the system is unknown. The system is dynamic, constantly evolving to meet changes in requirements. Figure 3, from the Defense Acquisition University, displays how incremental and spiral development interact under the evolutionary acquisition strategy.

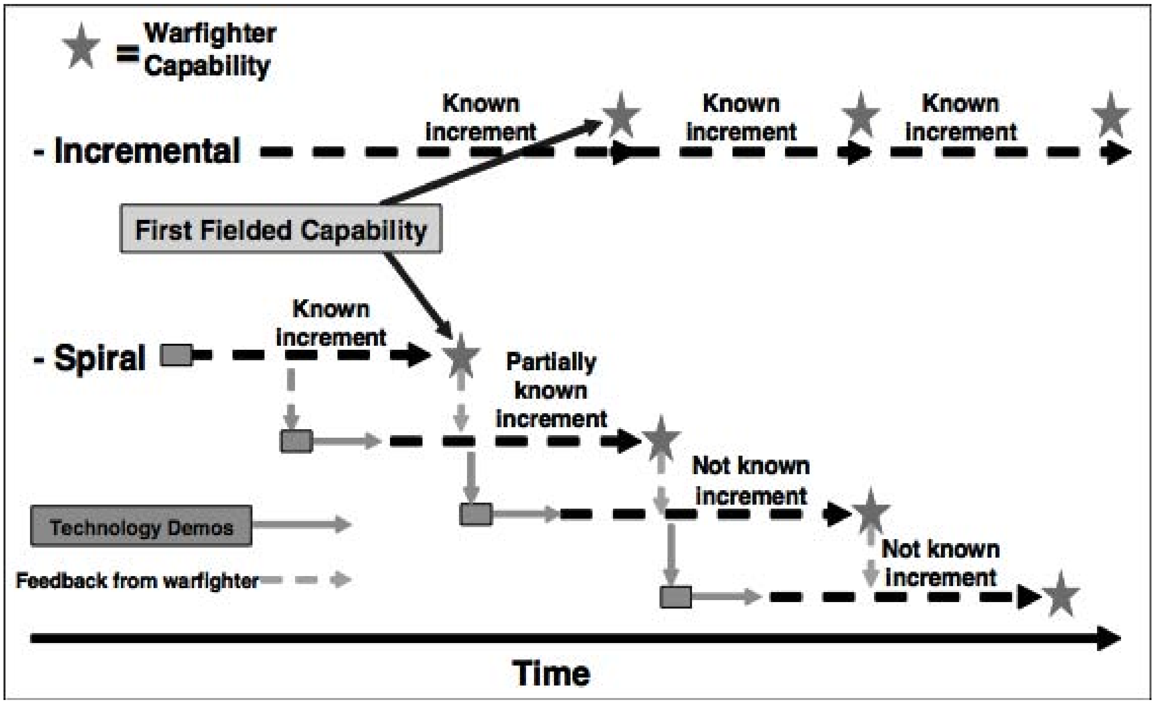

Figure 3. Spiral and Incremental Development in EAS (From Defense Acquisition University, 2003)

Operationally, there are challenges to implementing EAS into programs. Cost estimation at the initial phases of the program is one of the greatest concerns (RAND, 2005). However, throughout the process, costing is a continual challenge. In the case of IT, the cost to upgrade later increments, changes in technological maturity, etc., makes cost estimations difficult for program budgeting. Some benefits of EAS are:

- Rapid deployment of an operational capability
- Increments of the overall program are more easily managed
- Enhanced granularity of requirements
- Enhanced management of timeline
- Allows for greater requirements flexibility

The benefits and disadvantages of EAS should be considered for software intensive systems in which requirements are dynamic yet well defined and the overall end-state of the system is unknown. Although there are several advantages that an organization may leverage from an Evolutionary Acquisition Strategy, there are drawbacks to this approach. The below list is not all encompassing but merely represents a few of these drawbacks. The disadvantages of EAS are:

- Increased number of Milestone reviews
- Difficulty of configuration management
- Likelihood that the "User" representative will disagree to anything less than the objective solution
- Operational issues related to differences in system capability
- Cost increases may lead to breaches
- Problems with programming and budgeting funding streams for multiple iterations.
- Testing issues (Boudreau, 2010)

An Evolutionary Acquisition Strategy is the preferred method of IS procurement within the DoD. This acquisition approach calls for either an incremental development. This approach allows for an initial operating capability (IOC) to be achieved as an initial solution to user requirements. It also provides greater flexibility for evolving mission needs. However, if initial costing estimations are not carefully executed, this approach can result in cost overruns.

2. Product Line Acquisition (PLA)

A product line acquisition (PLA) strategy is a plan of action for achieving a specific product line goal or result through contracting for products and service. Potential software services include elements of core asset development, product development, and management. Acquiring services means contractually engaging an identifiable task rather than furnishing an end product. A product line approach is a natural fit for specifying and coordinating efforts across a distributed or geographically dispersed workforce (SEI, 2010).

A product line is defined to be a group of products sharing a common, managed set of features that satisfy specific needs of a selected market or mission (Bergey, 1998). PLA involves core asset development and product development using the core assets, both under the aegis of technical and organizational management (SEI, 2010). Figure 4 from Carnegie Mellon's Software Engineering Institute demonstrates how the three essential activities interact in order to field product line architecture. Each rotating circle represents one of the essential activities. All three are linked together and in perpetual motion, showing that they are all essential, inextricably linked, and highly iterative, and can occur in any order (SEI, 2010).

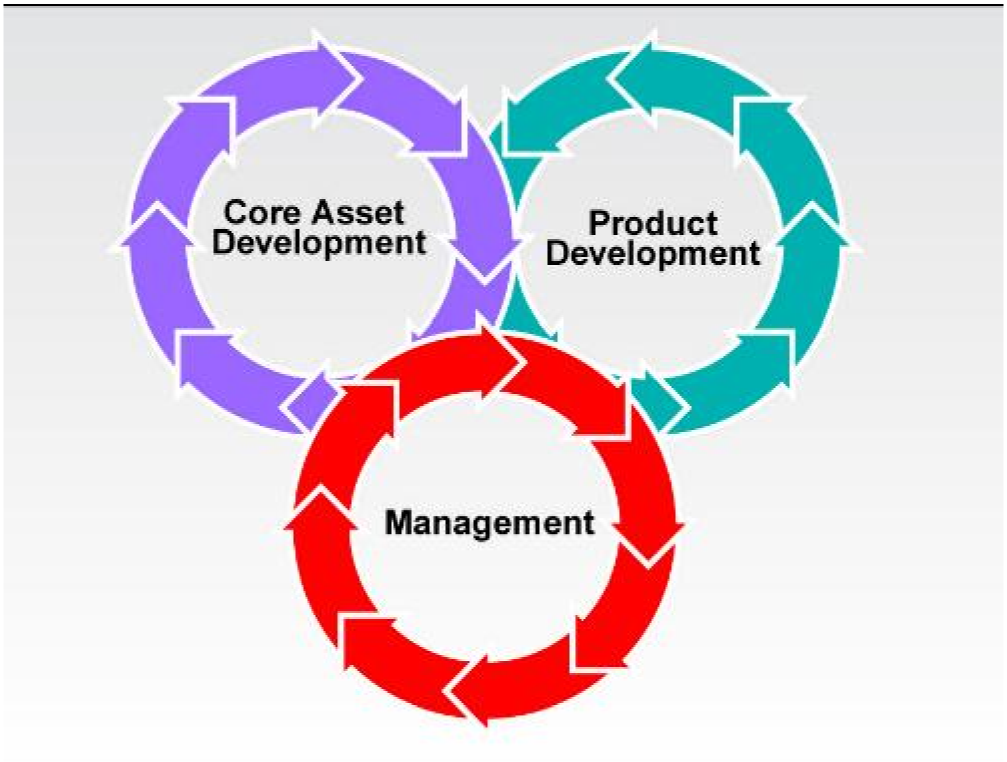

Figure 4. Activity Interaction for PLA (From Carnegie Mellon University Software Engineering Institute, 2010)

When considering using PLA, the architecture needs to be developed from the outset. One acquisition strategy, which is most applicable to government agencies that rely very heavily on acquisition, involves procuring only an architecture in the first stage, procuring other core assets in the second stage, and procuring products (built from the core asset base) in the third stage (SEI, 2010). There are four acquisition strategies for acquiring an architecture:

- Systems Architect
- Single Contractor
- Collaborating Contractors
- Standards Group

a. Systems Architect

In this architecture acquisition strategy, a single contractor develops the architecture for the system. However, the funding and ownership is attributed to the acquiring organization. A different architect is hired for the actual implementation of the architecture. This is done to manage the risk of the architecture not meeting the program requirements. It is important to note that cost adherence could still be an issue in this strategy (SEI, 2010).

b. Single Contractor

In this strategy a single contractor develops some components or the system under the contract. The contractor supplies the architecture and ownership. Control over the system is negotiated between the contractor and the acquiring organization.

c. Collaborating Contractors

A contract is developed that requires a group of contractors to collaborate on developing an architecture that they all can use later. In addition, each of the contractors is awarded a contract to develop and maintain some of the system's components. Ownership of the architecture is usually shared among the development contractors, with the acquiring organization holding the licensing rights. The acquiring organization funds joint development and manages the architecture requirements (SEI, 2010).

d. Standards Group

An architecture is either built by a "standards group" or conforms to established standards is acquired. Industry and/or government collaboration creastes a public architecture. The acquiring organization influences but does not control or own the product line architecture (SEI, 2010).

Software Reuse is a critical part of the Product Line concept. Software reuse is the process of creating software systems from existing software rather than building software systems from scratch (Krueger, 1992). In reuse proven technologies, standards and code are reused in new and subsequent products. The benefits of this approach are cost-savings, reliability, and efficiency.

For the military, product lines may leverage software and systems that have already been proven in the commercial sector to meet mission requirements, and/or core business processes. Pursuing a PLA can result in substantial cost savings and systems that are cohesive in nature. This cohesiveness can be helpful when integrating systems into a standardized architecture. Additionally, commands may use Commercial-of-the-Shelf (COTS) products, that interface well together, and can be modularly moved, removed, and upgraded when necessary.

Operationally, we can find an example of Product Lines in ship classes. The Guided Missile Destroyer (DDG) is a standard system of systems that leverages proven technologies that have been iteratively developed to yield a line of products. The Tomahawk missiles that are a part of its armament are a result of software that can be used on other tactical platforms as well as the DDG. The Shipboard systems from the Combat Systems Suite to the Engineering Plant are a result of product line architecture acquisition.

Product Line Architectures are characterized by the capability of being highly cohesive, yet loosely coupled. Apple's family of products is a highly visible example of a PLA that is highly cohesive yet loosely coupled. A system that is highly cohesive means that its components fit well together in an almost seamless integration. In the case of ITunes, this software works with both Macintosh hardware and software systems (its native platform), and PC hardware and software systems, with virtually no integration issues. Systems with components that are loosely coupled can be used on multiple software or hardware instances with no issue to the stability or functionality of the system. For example, ITunes does not need an IPod to function. If ITunes is degraded the iPod will still function as configured.

e. Benefits of PLA

Organizations can gain an advantage in their business mission area, through the implementation of PLA. By assessing and developing core assets and processes, and developing other systems and processes to reuse those core assets, an organization can derive numerous savings. Some of the organizational benefits of PLA are:

- Increased product quality
- Increased customer satisfaction
- More efficient use of human resources
- Decreased product risk

The advantages gained in instituting Product Lines permit noticeable organizational improvements, which ultimately result in competitive advantage.

f. Disadvantages of PLA

Although PLA can lead to numerous gains within an organization's core processes, instituting this strategy can be somewhat difficult. It takes a certain degree of maturity in the developing organization to field a product line successfully. Technology change is not the only barrier to successful product line adoption. Changes in management and organizational practices are also involved. Successful adoption of software product line practice is a careful blend of technological, process, organizational, and business improvements (SEI, 2010).

3. Performance-Based Acquisition

Performance-Based Acquisition (PBA) is the government's preferred approach for acquiring service (Denett, 2007). PBA involves acquisition strategies, methods, and techniques that describe and communicate measurable outcomes rather than direct performance processes. PBA is a technique for structuring all aspects of an acquisition around the purpose and outcome desired as opposed to the process by which the work is to be performed (government Services Administration, 2010). Performance-Based Service Acquisition (PBSA) strategies strive to adopt the best commercial practices and provide the means to reach world-class commercial suppliers, gain greater access to technological innovations, maximize competition and obtain the best value to achieve greater savings and efficiencies (Office of the UnderSecretary for Acquisition Technology and Logistics, 2001). PBSA operates under the need to meet mission requirements as they arise. The performance of systems and services as well as contractors are measured and assessed to ensure outcomes are meeting mission need as specified. PBSA assists agencies in achieving the following objectives:

- Maxmiize Performance
- Maximize competition and innovation
- Shift in risk
- Achieve Savings

The above objectives are achieved through performance requirement analysis, contractor performance assessment, contractor incentives, and market research,

a. Performance Requirement Analysis

This aspect of PBSA assists the team in identifying and defining desired outcomes and requirements. Overall, what needs to be accomplished is viewed from a top-level perspective. These outcomes are clearly defined as performance objectives and are included in a performance-based work statement and measurable performance standards are established. Figure 5 is a tree diagram that displays the flow of how desired performance outcomes are identified.

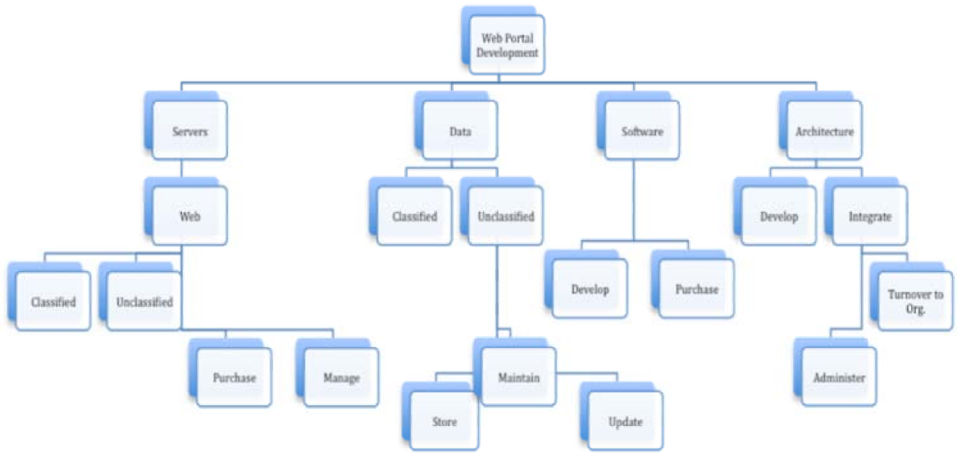

Figure 5. Tree Diagram for desired performance outcomes for Web portal development

b. Market Research

Market research is conducted wherein a Performance Based Services Acquisition (PBSA) team collects and analyzes information on commercial capabilities, processes, pricing, incentives, warranties, and delivery and other standard terms and conditions. This information is needed in order to determine the suitability of the marketplace for satisfying a need or requirement. The ultimate goal of market research is to help the acquisition team become informed consumers (Department of Defense Undersecretary for Acquisition Technology and Logistics, 2000)

c. Contractor Incentives

Incentives are a critical aspect of PBSA. Incentives, based on cost, schedule or quality of performance, are used to motivate superior contractor performance. Incentives can lead to improved competition among contractors, which can result in greater cost savings and value to the government. The types of contractor incentives are:

- Cost
- Performance
- Delivery
- Mixed

According to section 16.402 of the Federal Acquisition Regulation (FAR), Cost incentives, "take the form of a profit or fee adjustment formula and are intended to motivate the contractor to effectively manage costs." This approach offers a potential cost-savings for the government.

Performance Incentives are related to the product's performance characteristics. Certain performance criteria are established, these criteria are assessed through evaluation and testing. This type of incentive can also be related to the contractor's performance quality. An example of performance incentive is the speed of a ship. The Navy sets a threshold of 25 knots, which the contractor must achieve to meet the terms of the contract. In addition, the Navy sets an objective of 30 knots as the performance target for its new class of Patrol Craft. The Contractor earns the incentive fee by achieving performance up to the Navy's objective value.

Delivery incentives are most often used when the project schedule is primary priority for the contracting organization. For example, if troops require a new type of bulletproof vest within ten months, and the contract is awarded to deliver within nine, but includes an incentive fee for early delivery.

Mixed incentives, refer to the combination of cost, performance, or delivery incentives.

d. Contractor Performance Assessment

Performance assessment is conducted through periodic performance evaluations of the contractor. This is to ensure that the government is receiving quality products and services in accordance with the defined desired outcomes listed in the performance work statement. Performance-based service acquisition has many benefits. They include:

- Increased likelihood of meeting mission needs
- Focus on intended results, not process

- Better value and enhanced performance
- Less performance risk
- Contractor flexibility in proposing solution
- Better competition: not just contractors, but solutions
- Shared incentives permit innovation and cost effectiveness (Integrated Acquisition Environment, 2010)

The DoD recognized the benefits of the PBSA strategy when acquiring services. In 2000, the Undersecretary of Defense for Acquisition Technology and Logistics (AT&L), J.S. Gansler stated, "It is the policy of the Department of Defense (DoD) that, in order to maximize performance, innovation, and competition, often at lower cost, performance-based strategies for the acquisition of services are to be used wherever possible…to ensure that the Department continually realizes these savings and performance gains, I establish, at a minimum, that 50 percent of service acquisitions, measured both in dollars and actions, are to be performance-based" (Gansler, 2000).

D. DOD INFORMATION AND ACQUISITION GOALS AND REQUIREMENTS

DoD has expressed goals for achieving information superiority without specifying how the IT systems it builds should accomplish that goal. DoD has a great need for incremental approaches, because it has significant investment in current systems and a limited budget for innovation (Hayes-Roth, 2003). In order to keep pace with growing IS requirements DoD's vision "of a more agile and integrated organization whose systems are aligned with strategies, requires a shift from the existing approach of isolated "stove-piped" requirements development to an environment in which organizations embrace cross-community development," must be paired with a more robust acquisition process that strategically plans its investment in IT infrastructure (Carey, 2009).

The Department of Defense has indicated that the current acquisition process is inadequate for fielding mature, reliable IT systems rapidly enough to meet mission needs. Additionally, the spending associated with procuring these systems can often be well beyond what is necessary to meet mission requirements. Therefore, it is necessary to marry Strategic IT goals with a well-executed acquisition strategy to ensure that user-defined requirements are met in a reasonable timeframe, and within budgetary constraints. In the realm of IT systems, wherein technology maturation occurs at an extremely rapid pace, current IT acquisitions must be developed with the capability of leveraging mature technologies to continue to meet mission requirements and avoid obsolescence. In order to facilitate these goals, acquisition reforms and legislation has been passed to provide guidance to acquisition decision makers.

1. Clinger-Cohen Act of 1996

The Clinger-Cohen Act (CCA) legislation outlines the Director of Office of Management and Budget (OMB) duties in ensuring the efficient usage of IT systems in accomplishing Federal responsibilities. It provides guidance for executive considerations for more efficient acquisition of information systems and services. It further indicates the designation of useful executive agents tasked with developing and instituting best practices in the acquisition of information technology (Office of Management and Budget, 1996). Notable requirements of the Act are:

- The designation of a Chief Information Officer (CIO)
- The requirement to balance technology standards and technology spending
- The implementation of results-oriented management by establishing strategic goals
- Ensuring a clear, simplified and understandable IS acquisition process
- Establishment of a DoD-wide technical architecture to avoid fragmented information systems

With regards to IS acquisition, the CCA calls for a clear and understandable process that specifically addresses the management of risk, incremental acquisitions, and the need to incorporate commercial IS in a timely manner (Office of Management and Budget , 1996). IS capability delivered incrementally presents an effective solution for managing evolving user requirements, technology maturation, and mission changes. The document also refers to modular contracting as a method to acquiring incremental technology that is highly cohesive yet loosely coupled.

To meet the notable requirements outlined above, the CCA recommends performance-based and results-based management. The CCA clearly identifies activities that components should consider when making investments in Information Technology:

(B) Determine before making an investment in a new information system

(i) Whether the function to be supported by the system should be performed by the private sector and, if so, whether any component of the executive agency performing that function should be converted from a governmental organization to a private sector organization; or

(ii) Whether the function should be performed by the executive agency and, if so, whether the function should be performed by a private sector source under contract or by executive agency personnel (Office of Management and Budget, 1996)

The CCA provides DoD components with a top-level perspective of government expectations for the effecive management and acquisition of IS assets.

2. Modular Open Systems Approach (MOSA)

A Modular Open Systems Approach (MOSA) is both a business and technical strategy for developing a new system or modernizing an existing one. DoDD 5000.1 states that, "Acquisition programs shall be managed through the application of a systems engineering approach that optimizes total system performance and minimizes total ownership costs. A modular, open-systems approach shall be employed, where feasible." MOSA supports achieving the following:

- Reduced acquisition cycle time and overall life-cycle cost
- Ability to insert cutting edge technology as it evolves
- Commonality and reuse of components among systems
- Increased ability to leverage commercial investment

(Open Systems Joint Task Force, 2004)

MOSA allows for evolutionary acquisition of systems. Systems are developed modularly to allow for greater ease of development, maintenance, modification and upgrade. This modularity mitigates impact on the system as system evolution and upgrade occurs over time. The primary enabler in MOSA are open standards. Open Standards, are selected based on their maturity, commerical acceptance, and allowance for future technology insertion. Standards for interface between current and future systems, specify the physical, functional, and operational relationships between various elements namely, hardware and software. This is done to improve logistics support and permit interchangeability, interconnection, compatibility and/or communication (Open Systems Joint Task Force, 2004).

The DoD requires greater collaboration among services; therefore systems that can function in the joint environment, and meet the needs for information sharing must be acquired. To meet this need, greater consideration must be given to IT investment strategies to ensure the DoD takes maximum advantage of the benefits available from acquiring and managing commercial software as a DoD enterprise asset (Money, 2010). DoD recognizes that greater buying power can be leveraged for the acquisition of IS and software if it is managed at a higher level.

E. DON INFORMATION STRATEGY AND IT ACQUISITION GOALS

Following the lead of the DoD, the Department of the Navy (DON) has called for a re-alignment in how its information systems (IS) integrate with one another in order to fulfill greater needs for collaboration among different mission areas, and more seamless integration of business processes. DON has taken a much more strategic enterprise-centric approach to IT integration and acquisition. The Department of the Navy has a requirement for development of an enterprise architecture that includes the management and resourcing of key enterprise services (USN, 2003).

1. Enterprise Architecture (EA)

Enterprise Architecture (EA) is a conceptual blueprint that defines the structure and operation of an organization. The purpose behind an Enterprise Architecture is to determine the most effective means for an organization to achieve its current and future objectives. EA is helpful for defining the core business processes within an organization. It provides a framework for aligning those processes in a way that accomplishes the organizations overall mission. When an organization leverages IS resources that fit within the overall architecture, the organizations ability to achieve its vision is greatly enhanced.

The EA can define the relationships between information systems (IS) that are grouped into mission areas within an organization. These groupings of systems provide mission capabilities that the organization leverages to meet its goals. The EA contains systems that can work autonomously of one another, yet the whole relies upon the systems interaction to meet core process requirements. It is important for any organization, especially those within the DoD to identify those systems that are critical to their operations as mission essential. A 2001 memorandum from Acting Secretary of the Navy Robert B. Pire Jr. defines Mission Essential Information Systems (MEIS) as, "A Mission Essential Information System is a system that meets the definition of "information system" in the Clinger-Cohen Act, that the acquiring Component Head or designee determines is basic and necessary for the accomplishment of the organizational mission. A Mission Essential Information Technology System has the same meaning as a Mission Essential Information System" (Pire, 2001).

The DON has indicated that EA is the strategic approach to IS that it is instituting. In the DON Chief Information Officer's (CIO) 2009 memorandum on Department of the Navy Enterprise Architecture Strategy, he states, "Federally mandated EAs are a strategically-based means for DoD and DON to capitalize upon existing technological assets and make informed decisions about investments in new technology, in support of the war fighter. He further outlines the expected benefits of the DON EA. Expected strategic values from using the DON EA are to:

- Ensure compatibility, flexibility, and interoperability among all DON networked elements.
- Support the Capital Planning and Investment Control (CPIC) process to ensure the Department's mission is achieved through consistent decision-making processes for IS investments.
- Provide consistent support to the critical decision-making processes of the DoD and DON (e.g., Joint Capabilities Integration Development System (JCIDS), Defense Acquisition System (DAS), and Planning Programming Budgeting and Execution (PPBE)).
- Improve and promote broad use of common information sharing to ensure users can locate and access the right information at the right time.

- Leverage a Service Oriented Architecture (SOA) strategy, which organizes IS capabilities into interoperable, standards-based services that can be combined and reused to meet changing needs and threats.
- Support alignment of activities, processes, systems and data to other DoD components and government agencies.

Enterprise Architecture allows the Navy to facilitate information flows throughout its organization, even to disparate corners. It does this by integrating stove-piped systems with interconnected information systems to allow all assets to access necessary information resources for improved efficiency at mission accomplishment. EA is the DON strategy of choice, therefore all organizations within the department should strive to ensure their IS fit within that framework and organize themselves in a similar manner.

2. Strategic Planning for IS investment

Strategic planning for investing in IS and/or services should ideally consider an organization's long-term goals, and current business process activities. An organization must continually assess current and future needs to identify which IS investment will meet those requirements. It is important that these systems can balance their total overall cost with delivery of desired effectiveness. Therefore, strategic plans should consider software, hardware, funding, and long-term vision in order to be effective.

As for the DON, obtaining better control of IS investment is an acquisition goal. In 2009, the DON set forth an Information Technology Enterprise-Wide Investment policy that mandates greater leverage of DON buying power. This is power that components within DON can access. The policy is in place "to ensure that the DON speaks with one coordinated voice to suppliers when negotiating for most favorable terms and prices on products and services," which is applicable to acquisition vehicles that are multi-claimant, meaning systems that can support and be used by more than a single claimancy (Carey, 2009).

F. BENEFITS OF DEVELOPING A ROBUST IS ACQUISITION STRATEGY

The Acquisition Strategy allows for a top-level view into the acquisition of an IT system. By pairing an AS with a detailed IS Strategy, an organization can better leverage its buying power to acquire systems and services that will offer competitive advantages in prescribed core mission areas. The AS permits stakeholders to consider user needs and deliver a timely system that will meet those requirements within cost constraints. Additionally, an AS can be flexible to address evolving requirements due to mission changes. However, this flexibility must be closely managed to ensure that requirements changes do not result in cost overruns.

G. SUMMARY

Aligning an organization's IS strategy with a well-defined and robust acquisition strategy will result in delivering a system that will meet mission requirements when needed, and within funding parameters. There are several acquisition strategies that can be used to achieve an organization's IS goals. The most commonly used strategy within DoD is the Evolutionary Acquisition Strategy. However, Performance-Based Service Acquisition and Product Line Acquisition offer unique benefits for organizations such as the DoD that acquire many systems and services versus develop. The DoD has used the EAS and PBSA approaches to acquire IS. The PLA approach offers some benefits that should be considered, since the DON has identified Enterprise Architecture as its primary IS strategy.

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III. BACKGROUND OF CNSF ORGANIZATION AND APPROACH TO IT ACQUISITION

A. BACKGROUND OF COMMANDER, NAVAL SURFACE FORCES/COMMANDER, NAVAL SURFACE FORCES PACIFIC (CNSF/CNSP)

1. History

This section will present an overview of the origins and history of CNSF. Further exploration will be provided of the transformation of the command from its inception to its current role and responsibilities in the national defense structure.

In 2001, the Chief of Naval Operations designated Commander In Chief, Atlantic Fleet, as Commander, Fleet Forces Command (CFFC). CFFC responsibilities would include coordination, establishment, and implementation of integrated requirements and policies for manning, training, and equipping both Atlantic and Pacific Fleet assets during their inter-deployment training cycle. Type Commanders (TYCOMs) within each warfare area would support CFFC in executing these tasks. Commanders, Naval Surface Forces Pacific, Naval Air Force Pacific, and Naval Submarine Force Atlantic assumed duties as TYCOMs. These Fleet TYCOMs became knows as Commander, Naval Surface Forces (CNSF), Commander, Naval Air Forces (CNAF), and Commander, Naval Submarine Forces (COMNAVSUBFOR) (Commander Naval Surface Forces U.S. Pacific Fleet, 2009).

In 2004, CFFC established echelon three TYCOM lead organizations as three-star lead and two-star deputy TYCOMs on opposite coasts. Commander, Naval Surface Forces Pacific (CNSP) was established as the lead three-star and dually responsible for Pacific Surface forces as well as all Navy surface assets. Commander, Naval Surface Forces Atlantic (CNSL) became the two-star TYCOM. The policy was initially established as CNSF providing policy and guidance and CNSL providing current readiness oversight for all Surface Forces ships (Commander, Naval Surface Forces U.S. Pacific Fleet, 2009).

In 2005, the Surface Warfare Enterprise was established. The SWE mission included development of technically superior forces through well-maintained combatant crafts and highly trained personnel, prepared to quickly deploy in support of Combatant Commander tasking requirements (Commander Naval Surface Forces U.S. Pacific Fleet, 2009).

In 2006, The Chief of Naval Operations disestablished CFFC and Commander, Atlantic Fleet and renamed it to Commander, U.S. Fleet Forces Command (CUSFFC). Also in 2006 the SWE stood up and reinforced that CNSL was the Current Readiness Officer and established Class Squadrons as direct reports under CNSL.

In 2007, CUSFF established the Fleet Readiness Plan (FRP) to replace the inter-deployment training cycle (Commander Naval Surface Forces U.S. Pacific Fleet, 2009).

Commander Naval Surfaces Forces (CNSF) resulted from a 2001 CNO driven transition in the command structure.

2. Mission

The mission of CNSF is to man, train, and equip ships and other surface assets within the fleet with superior, technologically equipped surface platforms, and highly effective, well-trained sailors. These tasks are accomplished through managed readiness and training.

3. Responsibilities

The re-alignment of the CNSF structure and organization resulted in greater responsibility for the CNSF organization. Dually assigned as CNSF/CNSP, CNSF functions as the TYCOM for the surface ships in the Pacific to Commander, U.S. Pacific Fleet (COMPACFLT) for executing U.S. Code Title 10 responsibilities for manning, training, and equipping those ships. In addition, it answers to CUSFFC for any surface warfare request for forces. Finally, as the Pacific lead, it tracks Pacific ship readiness via West Coast Immediate Superior-In-Charge (ISICs) and Class Squadrons (CLASSRONs) (Commander Naval Surface Forces U.S. Pacific Fleet, 2009). CNSF is Director of the Surface Board that governs the Surface Warfare Enterprise (SWE). CNSF/CNSP Reports directly to CUSFF for Surface Force Warships Ready for Tasking to meet Combatant Commanders (COCOM) Request for Forces (RFF) requirements, and to CPF as Surface TYCOM for Pacific Fleet warships, as well as readiness trends and process improvement efforts to the Fleet Readiness Enterprise (FRE) as the SWE Commander, and sets ultimate SWE strategic direction (Commander Naval Surface Forces U.S. Pacific Fleet, 2009).

B. BACKGROUND OF COMMANDER, NAVAL SURFACE FORCES ATLANTIC (CNSL)

1. History and Mission

Currently, CNSL functions as Deputy CNSF. The mission of Commander, Naval Surface Force, U.S. Atlantic Fleet, is to provide combat ready ships and stations to the Fleet, and to ensure that those ships and stations are supplied the leadership, manpower, equipment, maintenance, training, and material needed to quickly achieve decisive victory at and from the sea. The Naval Surface Force Commander prescribes readiness and training requirements for assigned Forces, and ensures that deploying units meet prescribed readiness standards. The Surface Force Command includes all of the ships in the Atlantic and Mediterranean Fleets, with the exception of aircraft carriers, submarines, submarine support ships, and Military Sealift Command vessels (Commander, Naval Surface Forces, 2005).

2. Responsibilities

As Deputy CNSF, CNSL Reports directly to CNSF as his Force Deputy and also directly to CUSFF as Surface TYCOM for warfighting readiness of Atlantic Fleet ships. Additionally, Acts as Chief Readiness Officer (CRO), monitoring battle readiness of all surface ships, tracking metrics and analyzing trends via CLASSRONs, providing results and collaborating deep dive requirements with SWE Cross Functional Teams (CFTs). Monitors and tracks battle readiness via Atlantic (LANT) Fleet ISICs and CLASSRONs for basic phase certifications and across Fleet Readiness Programs (FRP) for LANT Fleet ships (Commander, Naval Surface Forces U.S. Pacific Fleet, 2009). CNSL shares administrative responsibility for training and operational readiness of the Atlantic forces.

C. BACKGROUND OF COMMANDER, FLEET FORCES COMMAND (CFFC)

1. Mission

Commander, Atlantic Fleet (COMLANTFLT) was established in 1975 as the TYCOM for Operational training and tasking for the U.S. Atlantic Fleet forces. The Command was re-designated United States Fleet Forces Command (USFFC) in 2001.

United States Fleet Forces Command supports both the Chief of Naval Operations and Combatant Commanders worldwide by providing responsive, relevant, sustainable Naval forces ready-for-tasking. The command provides operational and planning support to Combatant Commanders and integrated warfighter capability requirements to the CNO. Additionally, U.S. Fleet Forces Command serves as the CNO's designated Executive Agent for Anti-Terrorism/Force Protection (ATFP), Individual Augmentees (IA), and Sea Basing. In the USFF Guidance, the Commander discusses the following CFFC authorities:

- Authority to organize, man, train, maintain and equip assigned Navy forces;
- Budget Submitting Office (BSO) authority and responsibility for assigned forces, military and civilian personnel, infrastructure, and budget; and
- Authority to generate and communicate Navy global force management solutions concerning general purpose forces, ad hoc forces and individual augments to Commander, U.S. Joint Forces Command. (Harvey, 2009)

In collaboration with U.S. Pacific Fleet, U.S. Fleet Forces Command organizes, mans, trains, maintains, and equips Navy forces, develops and submits budgets, and executes readiness and personnel accounts to develop both required and sustainable levels of Fleet readiness. Additionally, the command serves as the unified voice for Fleet training requirements and policies to generate combat-ready Navy forces per the Fleet Response Plan (FRP) using the Fleet Training Continuum (FTC) (Navy PAO, 2010). To meet the requirements of Fleet training and readiness CFFC implemented the Fleet Readiness Enterprise (FRE).

2. Fleet Readiness Enterprise (FRE)

To meet readiness requirements mandated in the Navy's FRP, CFFC implemented the FRE. The FRE assists in meeting requirements for readiness against increasing varieties of threat, while balancing limited resources. The FRE was formed as a result of the Navy's adoption of an Enterprise approach to the "business" of military operations. The FRE focuses on asset integration, and effective usage of those assets despite stagnant resources, to provide a well equipped force ready for any tasking.

The FRE receives input from the various warfare enterprises. The structure of the subordinate warfare enterprises make up the readiness enterprise which represents readiness for the Navy Enterprise in the national defense structure. A dashboard system known as the Defense Readiness Reporting System (DRRS) provides top-level commanders with an updated view of force readiness for tasking. The Navy's dashboard is known as DRRS-N. Figure 6 depicts the organization of the FRE.

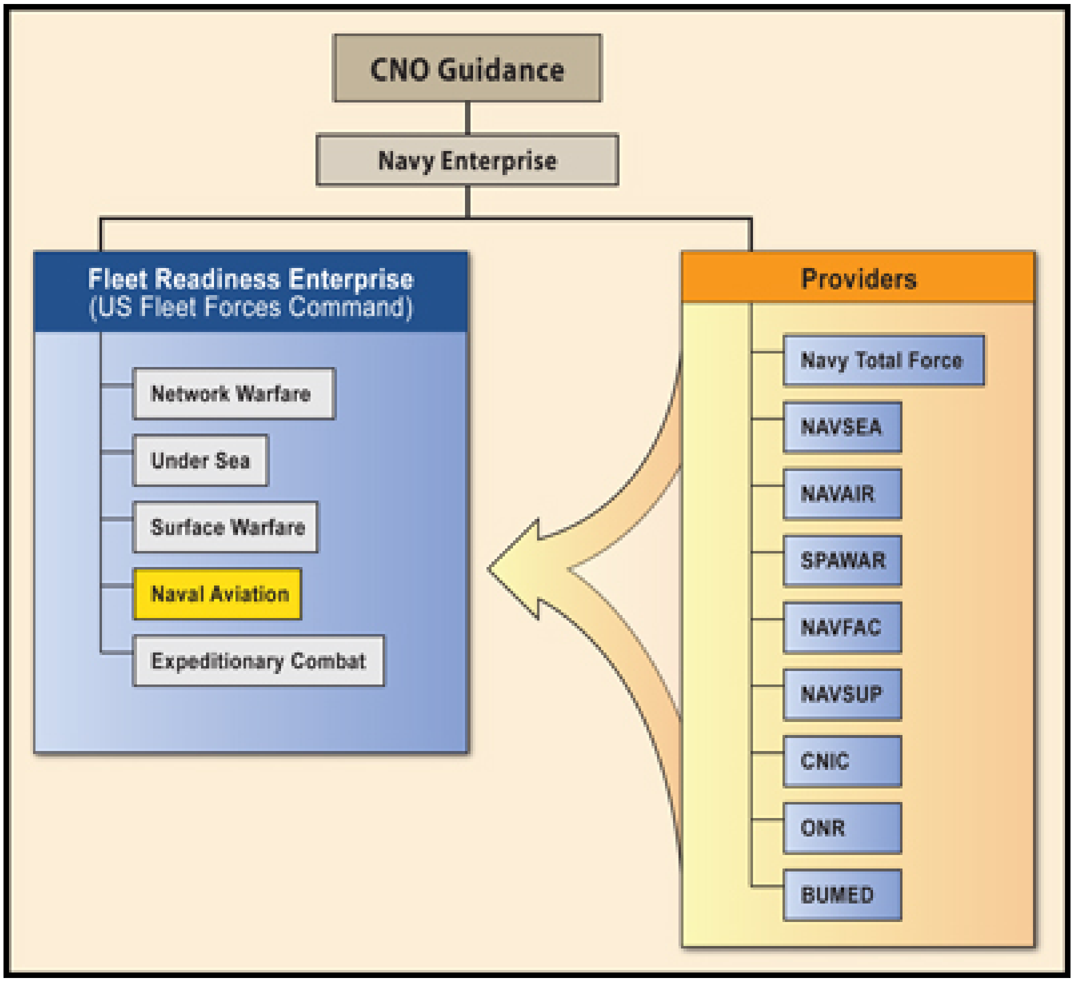

Figure 6. Supporting Structure of Fleet Readiness Enterprise (From Navy Enterprise, 2010)

A board, headed by the TYCOM, governs each Warfare Enterprise. The TYCOMs are:

- Commander, Naval Surface Forces (CNSF)
- Commander, Naval Air Forces (CNAF)
- Naval Network Warfare Command (NETWARCOM)
- Commander, Naval Submarine Forces (COMNAVSUBFOR)

These TYCOMS such as CNSF are frequently required to operate within a gray area between Title 10 TYCOM accountability issues and overlapping Enterprise responsibilities (Commander Naval Surface Forces U.S. Pacific Fleet, 2009). Figure 7 displays a scaled view of TYCOM organization and interaction in the Navy. Figure 8 depicts daily Title10 execution of the CNSF organization.

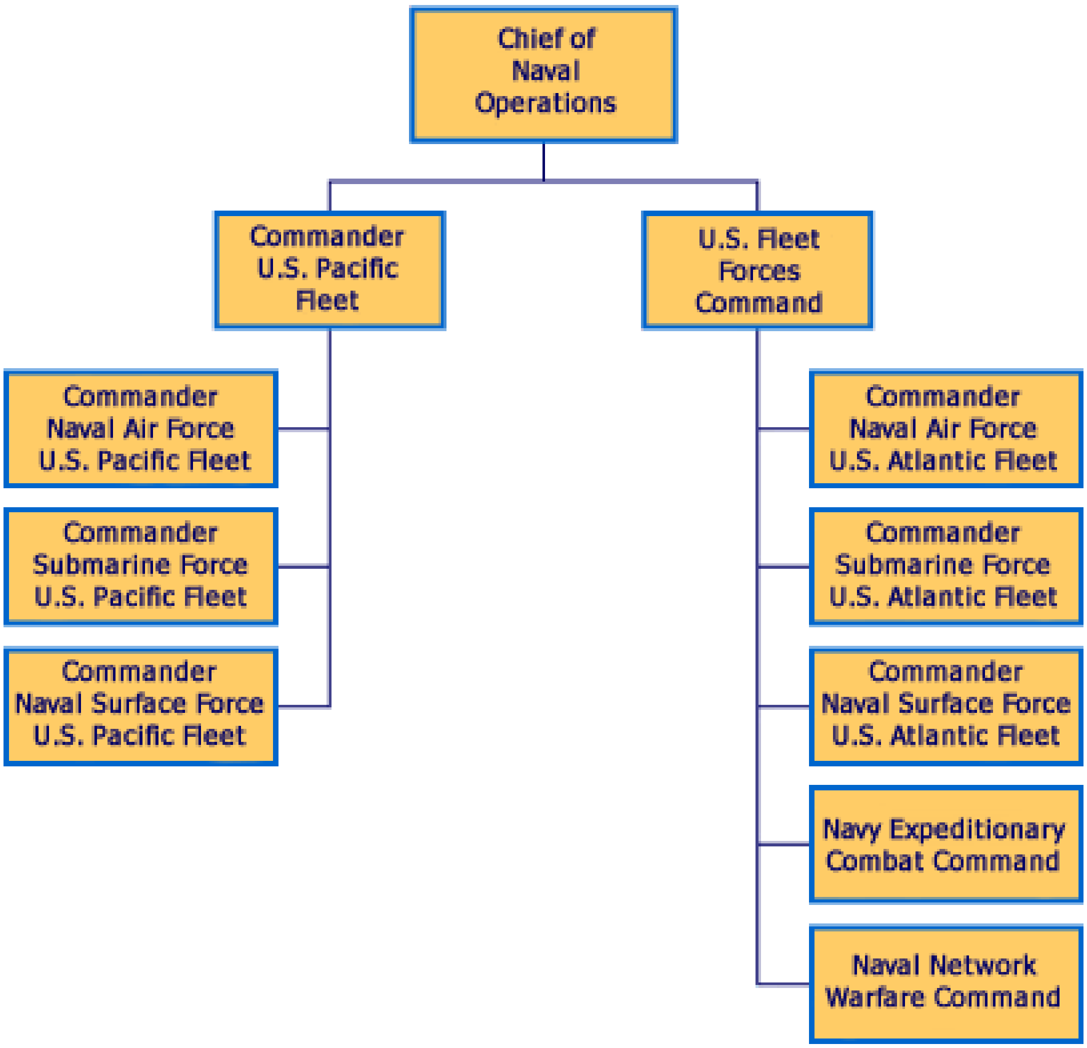

Figure 7. Type Commander Organization (From Navy Enterprise, 2010)

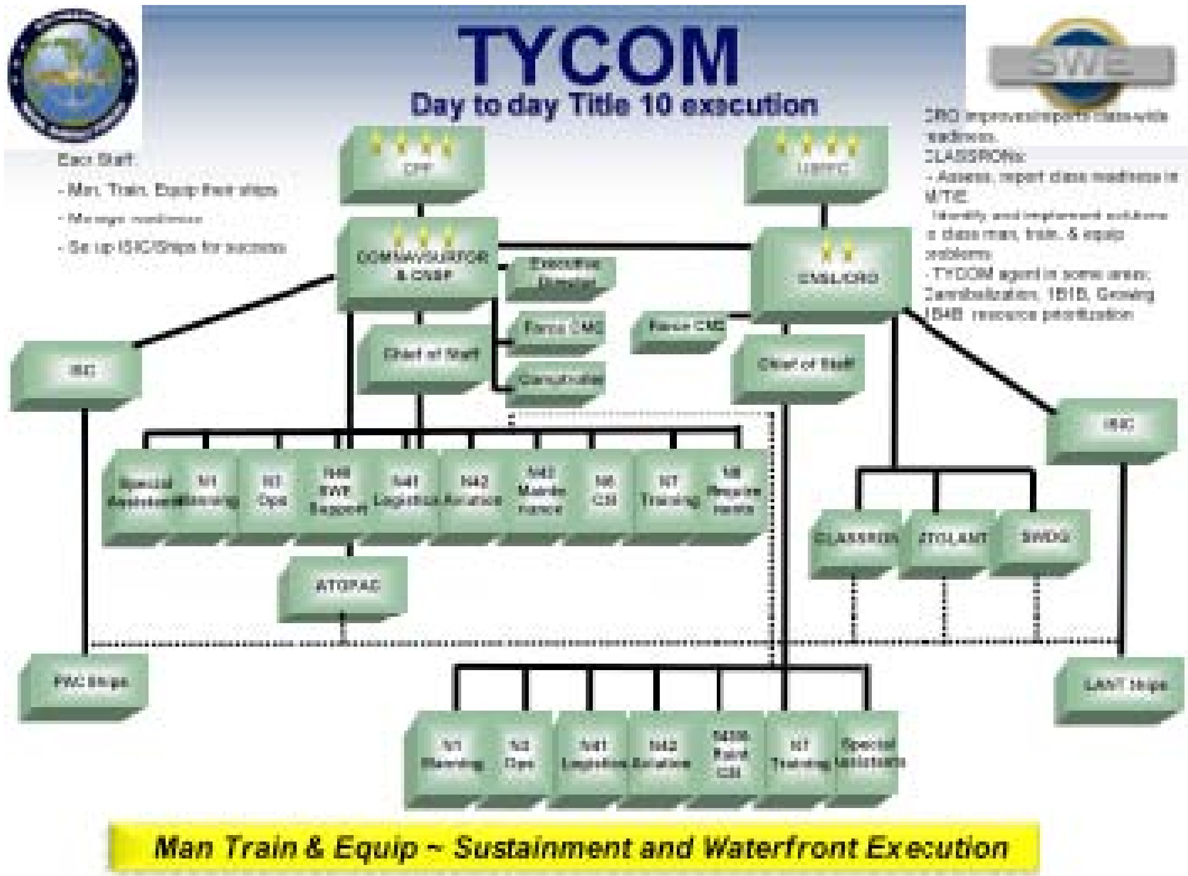

Figure 8. TYCOM Title 10 daily execution

The Warfare Enterprises are:

- Surface Warfare Enterprise (SWE)
- Naval Aviation Enterprise (NAE)
- Undersea Enterprise (USE)
- Naval Netwar/FORCEnet Enterprise (NNFE)
- Naval Expeditionary Combatant Enterprise (NECE)

Each of these Warfare Enterprises supports the FRE in delivering combat capability to Navy Components and Combatant Commanders, via the training processes of Commander Second Fleet and Commander Third Fleet (Navy Enterprise, 2010).

D. SURFACE WARFARE ENTERPRISE (SWE)

The SWE is made up of all Surface Warfare partners, from the people at Naval Sea Systems Command who research, develop and acquire our equipment; to the officers on the Navy staff responsible for funding; and commands responsible for logistics, personnel policy, maintenance support, and more. The SWE brings the Surface Warfare Community tools to improve processes, execute streamlined business practices, and gain efficiencies throughout our Navy to produce improved war fighting readiness (Surface Warfare Enterprise, 2010). The SWE is comprised of a Surface Board and headed by CNSF. Its mission is to ensure the fleet is prepared for emergent tasking, and available for combatant commanders to employ when necessary. The SWE is organized into Cross-Functional Teams (CFTs) that report to the Surface Board via the SWE Deputy on supporting elements vital to the operational readiness of Surface Forces. The CFTs are:

- Future Capabilities Team (FCT)
- Future Readiness Team (FRT)
- Personnel Readiness Team (PRT)
- Strategic Financial Management Team (SFMT)
- Current Readiness Team (CRT)

Figure 9 from a 2008 CNSF SWE Brief displays the SWE structure and interaction between the various elements within the enterprise.

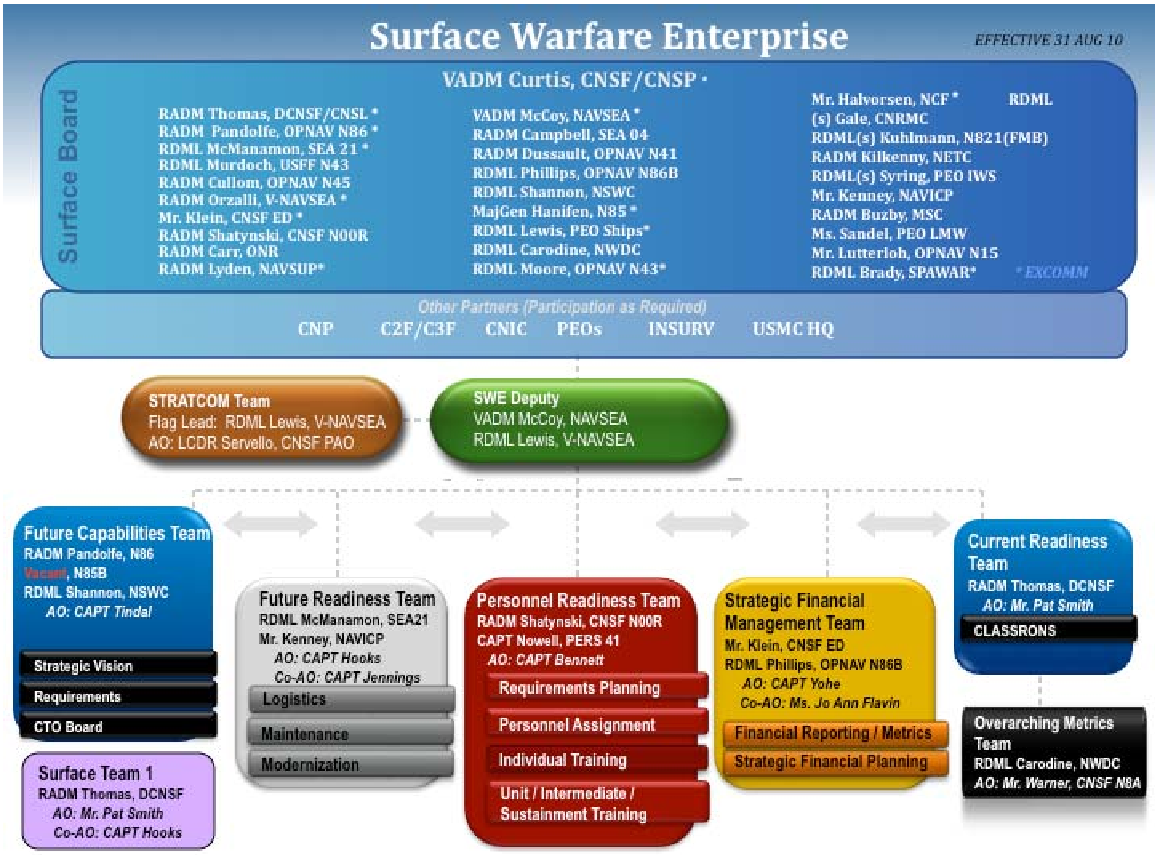

Figure 9. SWE Structure as of 2010 (From Pena, 2010)

1. SWE Systems and Capabilities

The SWE mission of ensuring the operational readiness of the Navy Surface Force is achieved through leveraging IS. The IS provide leadership with a dashboard view resulting in improved decision-making capability. The dashboard views are a result of applications that have been contracted into services within the past ten years. The primary application services used by CNSF are:

- Training and Operational Readiness Information Services (TORIS)
- Continuous Monitoring Program (CMP)
- Surfaces Forces Web (SURFOR Web/CNSF Web)

a. TORIS

The TORIS system of applications focuses on all aspects of training to support operational readiness for the surface force. Using a Web-based portal, TORIS provides high-level visibility into the training status of the Navy's surface force down to the unit level perspective. It is designed to assist commanders with the information management challenge they are faced with daily. TORIS is classified as an authoritative data source that "collects, stores, and displays proficiency and certification data from the surface fleet" (Commander, Naval Surface Forces, 2009).

TORIS was designed and implemented following the 9/11 terrorist attacks, after the need for an instant view of surface fleet readiness was identified. The need stemmed from the greater requirement for identifying surface units that were ready for Combatant Commander (COCOM) tasking. As a result, TORIS provided Unit Commanders with visibility into their unit readiness as compared to Afloat Training Group (ATG) requirements and metrics (Roberts, 2010).

TORIS is a vital component to the CNSF mission. It has automated key business processes to meet command mission requirements. Since its implementation the Service has enabled ATG to meet mandated reduced manning requirements and allowed ATG Ship Trainers and Evaluators to greater focus to the operational readiness of the Navy's surface assets, therefore greatly contributing to CNSF/SWE command goals. TORIS provides input to the "T" Pillar for training to the DRRS-N system to report force readiness to the national structure via the Defense Readiness Reporting System (DRRS), this is displayed in Figure 10, which was designed by the TORIS Project Team at ATG. The service integrates CNSF training requirements promulgated via the Surface Force Training Manual (SFTM). TORIS uses three processes gathering data used in populating the "T" pillar of DRRS-N:

- The Onboard training record, which gives unit commanders a view into their unit readiness.
- The periodic inspection and certification process for surface units. The goal is to decrease the time units spend under inspections and increase the time they are operational and ready for tasking.
- Automated DRRS-N population

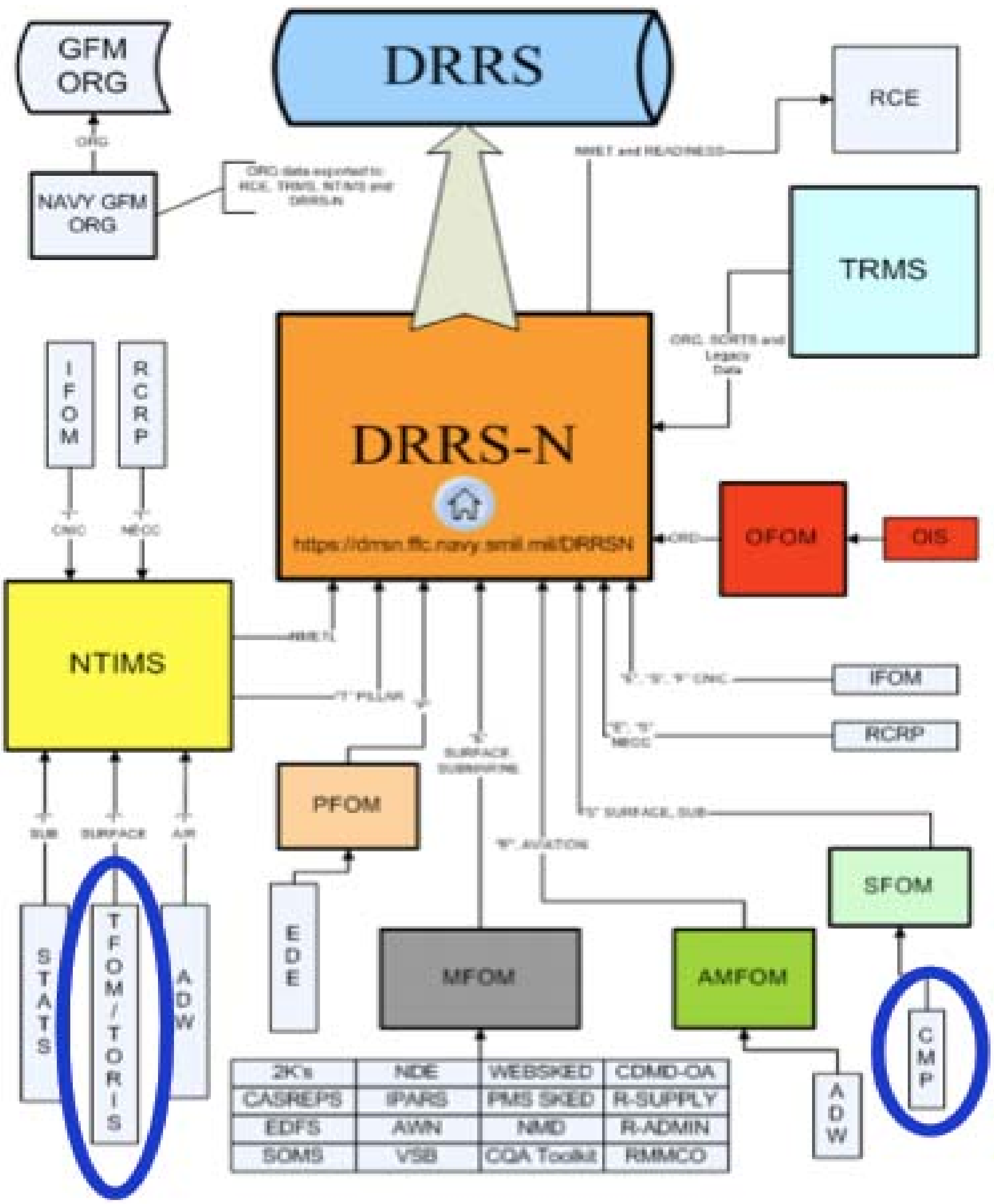

Figure 10. Relationship between TORIS and DRRS-N "T" Pillar (From TORIS ppt 2008)

While TORIS and its data is used primarily by CNSF subordinates for various Business Mission Areas (BMAs), there are other organizations outside of the FRE that are benefitting from the data resources that the service provides. For example, according to TORIS managers the program frequently receives data calls from OPNAV N7 in support of Navy Staff research efforts. CNSF also has a Memorandum of

Agreement (MOA) with the United States Coast Guard (USCG) to support the surface training and operational readiness of their forces.

In 2009, the TORIS contract cost approximately $2.3M, which has been consistent throughout the life of the program. The TORIS funding covers system maintenance, manning requirements, and further system development. Ultimately the system effectively meets requirement set forth by both CFFC in the FRP and CNSF training requirements guided by the SFTM.

b. CNSF Web/SURFOR Web

SURFOR Web provides a Web-based collaboration and knowledge management capability for CNSF surface assets. A 1999 U.S. Pacific Fleet staff knowledge management study revealed the need for a Web-based collaboration resource that would serve as the central location for organizational knowledge vital for mission support. 2004 marked the launch of the consolidated Commander Naval Surface Forces Pacific (CNSP) and Commander Naval Service Forces Atlantic (CNSL) Web portal. By 2007 CNSF required all public and private Websites of its subordinate commands to migrate to the SURFOR Web portal.

SURFOR Web is currently the central location for policy documents, directives, and most COMNAVSURFOR readiness tracking metrics (KPI's, FOMS, trends, costs, etc.). CNSF Web is the primary tool used to promulgate this information to ships and shore-based commands (Griffith). SURFOR Web's primary role is alignment of the force. It meets the CNO's FORCEnet, "Alignment" and Sea Enterprise goals as well as the business requirements of the Surface Forces Enterprise (SWE). SURFOR Web's evolution:

> 2004: The SURFORWEB portal NIPRNET/SIPRNET came on-line in October 2004 with the consolidated CNSP/CNSL collaboration site. Within a few months an Enterprise strategy was formulated and SURFOR commands were given the option of consolidating with the SURFOR Web.
>
> 2005: In response to the Cyber Condition Zebra initiative (DTG 101926Z MAY 2005), CNSF consolidated many of the claimancy legacy systems

into the SURFORWEB environment including the Continuous Monitoring Program (CMP) and ATGLANT Toolkit and Level of Knowledge Program (LOK)

2006: As part of the Cyber Condition Zebra initiative the SURFORWEB NIPRNET portal was migrated from the SPEAR network to the NMCI Enterprise Network in August 2006. A formal plan was documented in JUN 06 to consolidate the SURFOR Web with USFF's Fleet Forces Online (FFO) Portal.

2007: In response to NAVADMIN 145-07, CONSOLIDATION OF NAVY WEBSITES REDUCTION OF IM/IT FOOTPRINT, CNSF mandated that all Public and Private Websites migrate to the SURFORWEB environment. This consolidation was completed in November 2007.

2008: SURFORWEB NIPRNET received full accreditation (ATO) from NETWARCOM July 2008.

2008/09: SURFORWEB SIPR is awaiting Interim Authority to Operate (IATO) via Certification & Accreditation (C&A) submitted 15 Dec 08

2009: NETWARCOM DEC 08 Public Website Migration Supplemental Guidance

(Commander, Naval Surface Forces, 2009)

CNSF Web provides SWE staff and command units with a secure, central location for integrated Web-based collaboration. It is a resource for collaboration of vital CNSF business processes. To include:

- Publicly Accessible Websites
- Family Websites
- Private Business Collaboration sites
- Departure From Specifications Database (DFS)
- C5 Readiness Assessment (C5RA)
- Authorized Equipment Listing Program (AEL)
- COMET II
- Hot Wash
- 2MCAL
- War Fighting Improvement Program (WFIP)
- Continuous Monitoring Program (CMP)
- ATGLANT Toolkit and Level of Knowledge Program (LOK)

(Commander, Naval Surface Forces, 2009)

Current funding of CNSF Web is approximately $2.2M. The program is meeting the command's need for collaboration on both classified and unclassified enclaves. As a knowledge management tool, SURFOR Web is a key resource supporting the execution of some of its core business processes.

E. BACKGROUND OF COMMANDER NAVAL AIR FORCES (CNAF) AND THE NAVAL AVIATION ENTERPRISE (NAE)

1. History

Much like CNSF the Type Commander (TYCOM) for the surface forces of the fleet. Commander Naval Air Forces (CNAF) is tasked as TYCOM to represent the specific needs of the Navy's Aviation Force. The Command's beginning was nearly identical to that of CNSF in that there are command's on both coast; Commander Naval Air Forces Atlantic (CNAL) and Commander Naval Air Forces Pacific (CNAP). However, the Chief of Naval Operations placed Type Commanders (TYCOMs) in a "Lead-Follow" arrangement in October 2001. Under this arrangement, COMNAVAIRPAC became TYCOM for Air and assumed the additional title of Commander, Naval Air Forces (COMNAVAIRFOR/CNAF) (PAO, 2010).

2. Mission

> According to the CNAF command Website, the CNAF mission is "to man, train, equip and maintain a Naval Air Force that is immediately employable, forward deployed, and engaged. We support the Fleet and Unified Commanders by delivering the right force with the right readiness at the right time with a reduced cost ... today and in the future. (PAO, Commander, Naval Air Forces, 2010)

3. Naval Aviation Enterprise (NAE)

The NAE was formed as a partnership between multiple organizations within Naval Aviation to resolve interdependent issues that affect multiple commands (Williams, 2007). The NAE structure is very similar to the organizational formation of the SWE. An Aviation Board made up of Naval Aviation resource providers and supporters make critical decisions as to the direction and future of the Navy's Aviation community. Figure 11 displays the structure and the interaction among the various elements within the NAE.

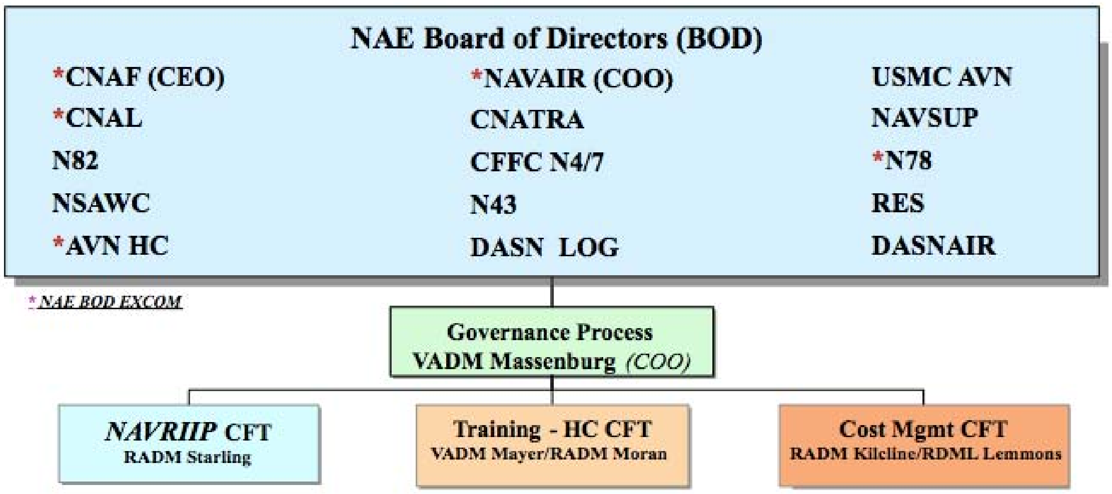

Figure 11. Naval Aviation Enterprise Structure (From Etter, 2006)

> The NAE "supports the readiness requirements of Naval Aviation by enhancing communication, fostering organizational alignment, encouraging inter-service integration, stimulating a culture of productivity, and facilitating change when change is needed to advance and improve. The NAE's single fleet-driven metric is: Naval Aviation forces efficiently delivered for tasking. (Naval Aviation Enterprise, 2010).

4. Naval Aviation Enterprise (NAE) Systems

a. SHARP

SHARP has tracked aviation training and readiness since 2000. Originally designed for tracking helicopter readiness, now it has widespread use, and its metrics have been used to defend flight hours.

The programs effectiveness can be attributed to a couple of factors. First, the performance factors are based on events that are required to achieve combat readiness. Secondly, consolidated reports are captured monthly and cataloged in an aviation data warehouse. Finally, multiple are taken into considerations to determine overall readiness.

The baseline has been evolving since its inception, currently strides are being made to lock down the current code. The ultimate goal is to develop a solid baseline and build modules as they are needed. Currently, enhancements are made to meet new user requirements. So far these changes have not been a financial burden because they are funded by the requesting agency. SHARP provides such features such as; log planning, logging of flight hours, and tracking dollars spent for programs.

b. Carrier Sierra Hotel Readiness Reporting Program (CV SHARP)

CV SHARP tracks carrier training and readiness down to the sailor level. It was modeled after the SHARP program, which had already proven the worthiness of tracking training. It was established in 2005 and its first true baseline of services was established in 2009.

It was initially used internal to carriers as a training tool. Since its inception, it has evolved from version 1.0 to 2.3 and is being installed on 9 carriers. This upgrade will allow those carriers the capability of reporting to DRRS-N, which is required by USFF. The funding for its evolution has come out of O&M funds from aviation flight hour money. Currently, this program's budget has been successfully managed. However due to anticipate future funding cuts, the Program Manager (PM) predicts a future of maintenance with very little software development.

The CV SHARP program provides NAE Board and resource supporters insight into the training and readiness of the Aviation Enterprise. As a result they are able to make decisions concerning resource allocation, and identify shortfalls. As a tool it is used track and report training accomplishments and gauge readiness for tasking (RFT) of its Aircraft Carrier CV(N) platforms.

In support of the Fleet Readiness Plan (FRP), CV SHARP provides readiness inputs to the "T" Pillar in the Defense Readiness Reporting System-Navy

(DRRS-N) for status of readiness for aviation forces. It provides CV(N) Commanding Officers (CO) a view into the training of the sailors within his command. The CO can use this information to predict the impact of shortfalls on his crew's operational capability (LeFon, 2009).

CV SHARP was acquired using an Evolutionary Acquisition Strategy (EAS), and is currently contracted for a 10 year period resulting in a $4M/year contract.

F. SUMMARY

This chapter discussed the backgrounds and histories of United States Fleet Forces Command (USFFC) and subordinate Type Commanders (TYCOMs) Commander, Naval Surface Forces (CNSF) and Commander, Naval Air Forces (CNAF). The Surface Warfare Enterprise (SWE) structure, mission and vital information applications were discussed. The TORIS and CNSF Web programs were reviewed, as well as their contribution to the overall achievement of SWE goals. History and mission of CNAF and the Naval Aviation Enterprise (NAE) were outlined. The Carrier Sierra Hotel Aviation Readiness Program (CV SHARP) purpose and background was discussed. The CV SHARP program is a vital component to achieving the mandated Fleet Readiness Plan (FRP).

IV. ANALYSIS AND FINDINGS

A. INTRODUCTION

This chapter will discuss both qualitative and quantitative findings discovered during this study. Both analyses will explore acquisition concepts and their applicability to how an organization functions in regard to the Acquisition Strategy Characteristics (ASC). The section closes with proposed solutions that connect the critical points associated with the ASCs.

In the quantitative section of the chapter, ordinal data will be presented that will identify statistical responses given by various decision makers via comparison surveys of vital Information Systems (IS) within the Surface Warfare Enterprise (SWE) and Naval Aviation Enterprise (NAE). The surveys are based upon the ASCs introduced in chapter two.

The section on qualitative analysis will compare the SWE and NAE goals and approaches toward acquiring similar ISs that are used in executing core business processes. It also offers a more in-depth analysis of the organizational goals and how those goals best fit with the Acquisition Strategies (AS) discussed in chapter two. Analysis of a GAO case study of companies in the private sector transformation in IS acquisition spending will provide a background for further recommendation for CNSF.

B. QUANTITATIVE ANALYSIS OF CNSF AND CNAF INFORMATION SYSTEM (IS) PROGRAM ACQUISITION

1. Introduction

In the quantitative section of the chapter, ordinal data will be presented that will identify statistical responses given by various decision makers via comparison surveys of vital IS within the SWE and NAE. The surveys are based upon the ASCs introduced in chapter two. The final analysis and the proposed solutions connect the critical points of the survey and directly relate to the ASCs.

2. Survey Analysis

The target programs for this analysis were the CNSF Web, TORIS, SHARP, and CV SHARP. This section is organized by the way the data is interpreted. First, the data is reviewed in terms of its mean and arranged by its frequency distribution. This provides a graphical overview of the survey results. The next section further defines the strength of the mean by considering each population's standard deviation. Finally, due to the small population size, nonparametric techniques provide information about the populations and the measuring variables which are the ASCs.

Table 1 shows how they responded to the questions. The ratings are based upon the following scale:

- Very significant or very important (Rating: 1)
- Significant or Important (Rating: 2)
- Moderately Significant or Moderately Important (Rating: 3)
- Little Significance or Little Importance (Rating: 4)
- Not Significant or Not Important (Rating: 5)

The survey measured the participants' perceptions of how their program was affected by changes in policy, personnel, funding, and requirements. The questions in the survey are based upon the ASC's presented in Table 1. In addition to the questions listed below, the survey also included questions about their programs integration, implementation, procurement, and certification. These questions captured time requirements and difficulty ratings and are located in Table 2. The data supporting these tables are located in Appendix A.

Category	Users per questions	PM CNSF Web Pacific	PM CNSF Web Lant	ATGPAC N7 TORIS	PM Toris Contractor	TORIS -Sr. Sys. Eng.- Cont.	TORIS -ATG N3	TORIS -ATG PAC N32 COTLO	TORIS ATG SHIPTRAIN	TORIS Enter. Arch.-Cont.	PM SHARP	PM CV SHARP
		CNSF Web					TORIS				SHARP	CVSHARP
Realism												
	What significance has the implementation of this program had on the Command's overall mission?	2.00	1.00	1.00	1.00	2.00	4.00	1.00	1.00	1.00	1.00	1.00
	Mean	1.50					1.57				1.00	1.00
	How significant has Command support been to the overall success of this system?	3.00	2.00	1.00	1.00	1.00	1.00	1.00	2.00	1.00	2.00	1.00
	Mean	2.50					1.14				2.00	1.00
	How significant did force-fit measures, that can't be compromised, affect the development or operation of this program?	4.00	5.00	4.00	4.00	1.00	3.00	2.00	3.00	1.00	3.00	2.00
	Mean	4.50					2.57				3.00	2.00
	How important have the role of priority levels, when compared to similar programs, affected decisions made for your particular program?	4.00	4.00	2.00	3.00	2.00	1.00	3.00	2.00	1.00	3.00	2.00
	Mean	4.00					2.00				3.00	2.00
	To what extent were realistic expectations important with regard to this program's scheduling and resource requirements?	3.00	4.00	2.00	2.00	1.00	2.00	1.00	2.00	1.00	2.00	1.00
	Mean	3.50					1.57				2.00	1.00
Stability												
	How significant will changes by the user or in capability cause a major disruption of the technical progress needed for the system?	4.00	5.00	4.00	4.00	3.00	2.00	2.00	3.00	1.00	4.00	4.00
	Mean	4.50					2.71				4.00	4.00
	How significant will the changes in policy or leadership affect the direction of this project?	3.00	4.00	3.00	2.00	1.00	1.00	3.00	1.00	1.00	2.00	2.00
	Mean	3.50					1.71				2.00	2.00
	How significant is the impact of having higher level supporters speaking on behalf of your program?	1.00	2.00	1.00	1.00	1.00	1.00	2.00	1.00	1.00	1.00	2.00
	Mean	1.50					1.14				1.00	2.00
	How significant could the use of an IPT improve the success of this program?	2.00	4.00	3.00	3.00	4.00	3.00	3.00	2.00	1.00	3.00	5.00
	Mean	3.00					2.71				3.00	5.00

Table 1. Survey Feedback (1 of 3)

	How would changes in industry, loss of a major contractor, or failure to modernize impact this program?	1.00	2.00	1.00	1.00	2.00	1.00	1.00	1.00	1.00	1.00	2.00	
	Mean	1.50		1.14							1.00	2.00	
	How would changes in personnel that cause a lack of accountability or a loss of audit trail affect this program?	2.00	2.00	1.00	2.00	2.00	1.00	2.00	1.00	1.00	3.00	1.00	
	Mean	2.00		1.43							3.00	1.00	
	How would changes in personnel that cause a lack of accountability or a loss of audit trail affect this program?	2.00	3.00	5.00	2.00	3.00	1.00	2.00	1.00	1.00	2.00	1.00	
	Mean	2.50		2.14							2.00	1.00	
Resource Balance													
	How significant have the management of budget for the personnel, facilities, and time affected the successful development or operation of this project?	2.00	2.00	2.00	2.00	1.00	1.00	1.00	2.00	1.00	2.00	1.00	
	Mean	2.00		1.43							2.00	1.00	
	How important was budgeting from inception to the overall execution of this program?	2.00	2.00	1.00	2.00	1.00	1.00	3.00	2.00	1.00	2.00	2.00	
	Mean	2.00		1.57							2.00	2.00	
	How important would being part of a continuous funding vehicle affect the financial stability of this project?	2.00	2.00	1.00	2.00	1.00	1.00	3.00	1.00	1.00	2.00	2.00	
	Mean	2.00		1.43							2.00	2.00	
Flexibility													
	How significant would it be if the user/customer was readily available to answer questions?	2.00	3.00	1.00	2.00	3.00	1.00	1.00	1.00	1.00	3.00	3.00	
	Mean	2.50		1.43							3.00	3.00	
	How significant would it be if the contract for the program had built in flexibility allowing changes to happen without consultation with the customer?	2.00	4.00	4.00	3.00	4.00	1.00	2.00	2.00	1.00	2.00	2.00	
	Mean	3.00		2.43							2.00	2.00	
	How important has risk management planning been to maintaining the program schedule?	4.00	3.00	3.00	2.00	2.00	2.00	3.00	1.00	1.00	2.00	1.00	
	Mean	3.50		2.00							2.00	1.00	
	How much of an impact to the design was attributed to ensuring that the program could support a balance among performance, productivity, and logistics?	4.00	2.00	3.00	2.00	3.00	1.00	2.00	2.00	1.00	3.00	2.00	
	Mean	3.00		2.00							3.00	2.00	
Managed Risk													

Table 2. Survey Feedback (2 of 3)

	How significant have uncontrollable requirement shifts affected this program?	3.00	3.00	5.00	4.00	2.00	1.00	2.00	2.00	1.00	4.00	1.00	
	Mean	3.00		2.43							4.00	1.00	
	How significant have the role of natural disasters affected the development or operation of this program?	4.00	5.00	5.00	5.00	5.00	5.00	4.00	4.00	1.00	4.00	5.00	
	Mean	4.50		4.14							4.00	5.00	
	What significance has funding changes had on the direction of this program?	2.00	4.00	1.00	3.00	2.00	1.00	4.00	2.00	3.00	3.00	3.00	
	Mean	3.00		2.29							3.00	3.00	
	How significant have government standards affected the development or operation of this program?	2.00	4.00	1.00	3.00	1.00	1.00	3.00	2.00	3.00	1.00	2.00	
	Mean	3.00		2.00							1.00	2.00	
	How important have changes with the contractor affected the development or operation of this program?	4.00	1.00	5.00	2.00	2.00	1.00	3.00	1.00	1.00	2.00	1.00	
	Mean	2.50		2.14							2.00	1.00	
	How important are the impacts of external directives that affect the development or operation of the program?	2.00	2.00	1.00	1.00	1.00	1.00	2.00	1.00	1.00	1.00	2.00	
	Mean	2.00		1.14							1.00	2.00	
	How important has the use of mature technology been to the development or operation of the program?	2.00	2.00	1.00	2.00	1.00	1.00	2.00	2.00	1.00	2.00	1.00	
	Mean	2.00		1.43							2.00	1.00	
	How important has achieving reliability, availability, and maintainability impact the development or operation of this program?	3.00	1.00	1.00	1.00	2.00	1.00	2.00	2.00	1.00	2.00	1.00	
	Mean	2.00		1.43							2.00	1.00	

Table 3. Survey Feedback (3 of 3)

Category	Users per questions	PM CNSF Web Pacific	PM CNSF Web Lant	ATGPAC N7 TORIS	PM Toris Contractor	TORIS -Sr. Sys. Eng.- Cont.	TORIS -ATG N3	TORIS -ATG PAC N32 COTLO	TORIS ATG SHIPTRAIN	TORIS Enter. Arch.-Cont.	PM SHARP	PM CV SHARP
		CNSF Web		TORIS							SHARP	CVSHARP
Continuous Variables												
	Time to Implement	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	5.00
	Mean	2.00		2.00							2.00	5.00
	Time to Integrate	1.00	1.00	1.00	1.00	5.00	1.00	1.00	1.00	1.00	1.00	2.00
	Mean	1.00		1.57							1.00	2.00
	Time to achieve Certification	1.00	1.00	1.00	2.00	1.00	1.00	2.00	1.00	2.00	1.00	2.00
	Mean	1.00		1.43							1.00	2.00
Likert Scales												
	Level of difficulty in Integration	5.00	6.00	5.00	4.00	5.00	5.00	6.00	5.00	4.00	5.00	7.00
	Mean	5.50		4.86							5.00	7.00
	Level of difficulty in Procurement	4.00	5.00	5.00	5.00	6.00	5.00	6.00	5.00	4.00	3.00	7.00
	Mean	4.50		5.14							3.00	7.00
	Level of difficulty in Certification	6.00	5.00	3.00	6.00	4.00	5.00	6.00	4.00	5.00	6.00	7.00
	Mean	5.50		4.71							6.00	7.00

Table 4. Survey Feedback: Time and Difficulty Rating

a. Population Description

The mean ratings from the survey are measured in terms of frequency. The frequency distribution provides insight into the overall decision-making climate for each program (Schutte, 1977). This information can also help describe each population. The supporting data for the remaining quantitative analysis is located in Appendix B.

(1) Acquisition Strategy Characteristics Survey Results. In figure 12, the chart below shows the frequency of occurrence for rating each question on a scale of "1" to "5". The bars in the chart are based upon the mean values of their replies and the standard error indicating the difference between the sample size and population (Rumsey, 2003). The intersecting bracket on each bar indicates the amount of standard error. This chart indicates the following:

- The Mean rating from those surveyed for TORIS was 1.81 with a standard error of .15. This is an indication that they have a strong sense of operational satisfaction and view the impacts of changes to their program as important.
- The Mean rating from those surveyed for CNSF Web was 3 with a standard error of .19. This is an indication that they have a moderate view of impacts on their program.

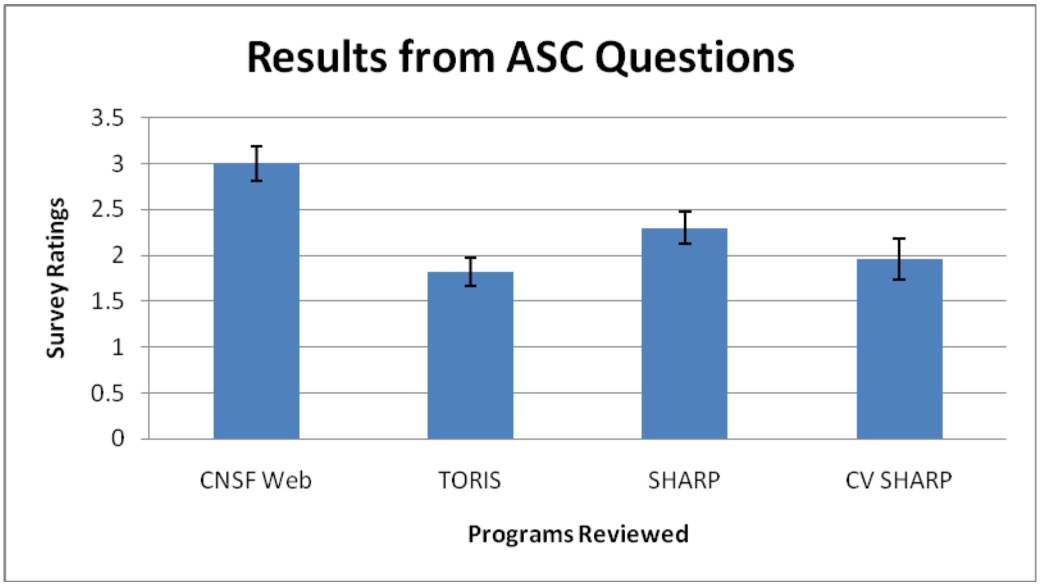

Figure 12. Survey Results for five Acquisition Strategy Characteristics (ASC)

The participants also answered questions regarding the level of effort it took to bring their programs into existence, as displayed in Figure 13. Most programs were implemented in two years. CV SHARP has taken five years; according to the PM they are still developing new usage features. SHARP took two years for the initial implementation and is planned out for the next 10 years. Integrating these programs within their current baselines varied. Even though the Certification was achieved by most in one year, most agree that it a task that must be managed well.

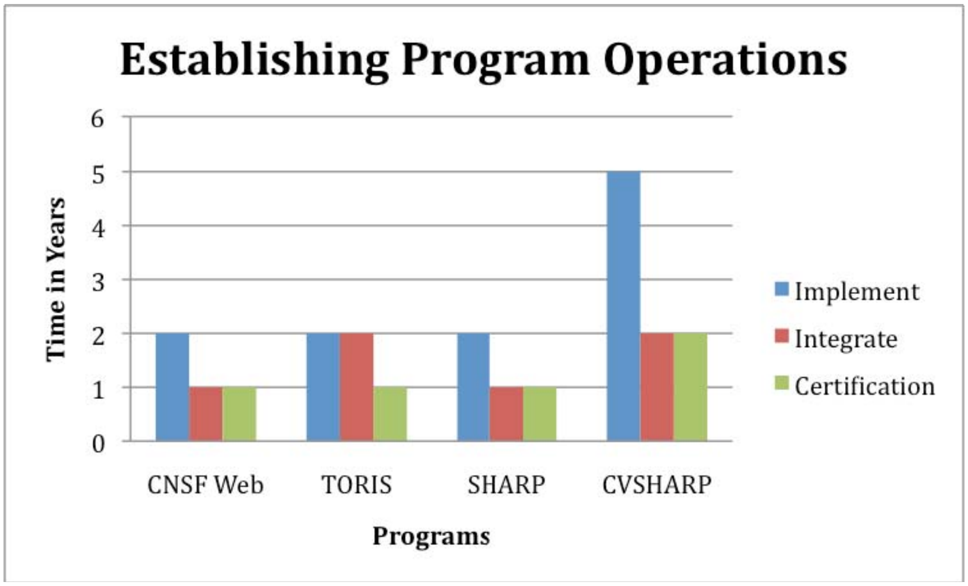

Figure 13. Survey Results for Time in Years for Program Development and Operation

Next, the participants responded to questions regarding the level of difficulty experienced with the integration, procurement, and certification of their program, as displayed in Figure 14. They rated their experience on a scale of one to seven, with seven being the worst. The CV SHARP PM viewed all three categories as being very difficult. Across the board, program certification was challenging because the organizations did not have a trained and knowledgeable person to perform this task. Despite the fact that these programs are the product of a study or a critical mission need, procurement challenges still existed.

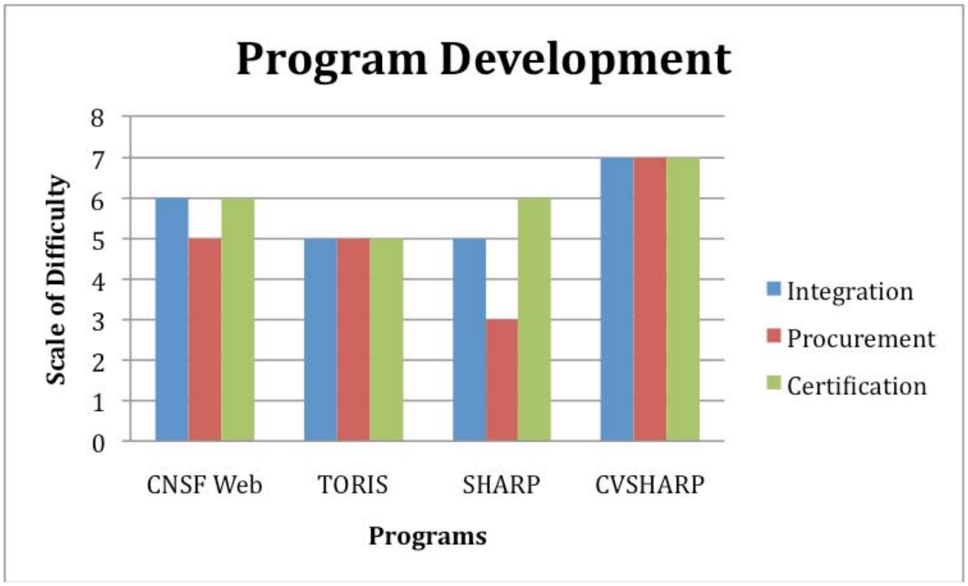

Figure 14. Level of Difficulty for each program's creation

(2) Survey Responses - Distribution by Program. The set of charts in Figure 15 provide a depiction of how the replies to the survey are distributed by program. CNSF Web rated the survey questions has having moderate to little impact on their program, which shows confidence in their Web based program to operate well in spite of changes. TORIS and CV SHARP rating shows their concern regarding external factors affecting their program's operation and growth, which shows their sensitivity to changes in their customer, policy, and requirements. The SHARP rating, which mostly falls between 1 and 3, indicates confidence in their stability to maintain operations despite changes.

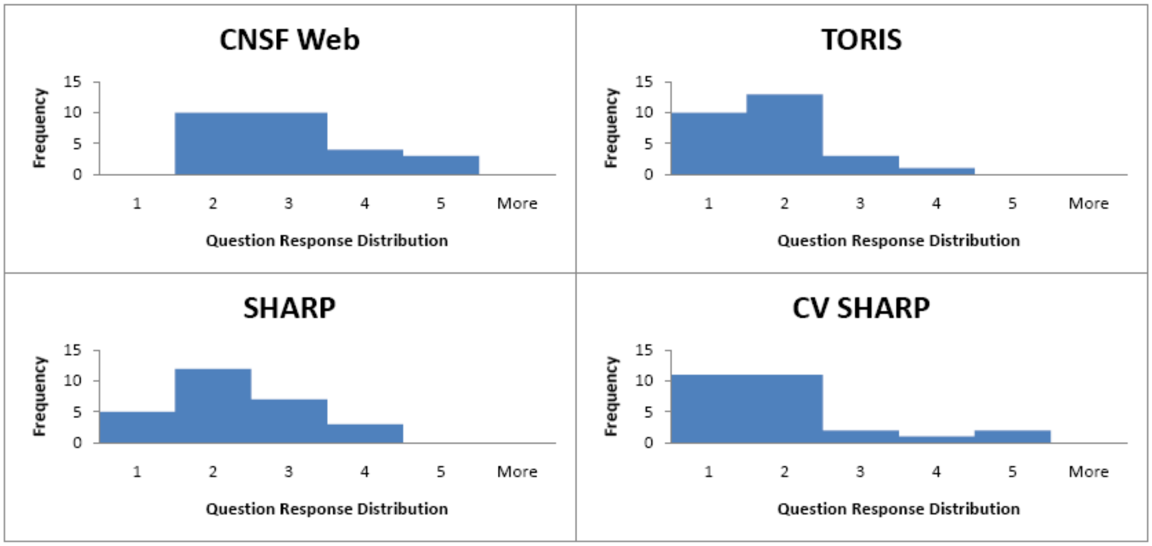

Figure 15. Program response to Survey Questions

b. Data Variability Analysis

The mean data and the standard deviation, of the independent programs, is analyzed in terms of variability when compared with the ASCs shown in Table 5 (Rumsey, 2003). CNSF Web and SHARP show zero variability, or no deviation, for Resource Balance, This indicates the participants replied exactly the same way to the questions. Additionally, TORIS and CV SHARP show a very low variance for Resource Balance. The participants replied to this line of questioning with very similar responses regarding its importance and significance. All four programs show a moderately low variance for flexibility. This is an indication that they are similar in their thinking on how to deal with change. Risk management and Stability show the highest levels of variability across all four programs, this is an indication that training in the importance of risk managements and guidance on increasing stability may need to be a future focus as organizations seek out improvement measures.

Variable	CNSF Web	TORIS	SHARP	CV SHARP
Realism	3.6(1.1)	2(.7)	2.2(.8)	1.4(.5)
Stability	3(1.2)	1.9(.9)	2.3(1.1)	2.4(1.5)
Resource Balance	2(0)	1.3(.6)	2(0)	1.7(.6)
Flexibility	3.3(.5)	1.8(.5)	2.5(.6)	2(.8)
Risk Management	2.9(1)	1.9(1)	2.4(1.2)	2(1.4)

Table 5. Mean (Standard Deviation) - Programs vs. ASC

c. *Nonparametric Measuring Techniques*

The focus of this section is to compare the responses from the four programs. The population is small in order to establish a comparison between programs with similar missions and comparable dollar values. Small populations are better suited for nonparametric evaluations techniques. These techniques, also called distribution-free statistics, focus on ranked data. These techniques also look to determine if the population locations are different, unlike the parametric measures that determine if the mean is different (Keller, 2009). They allow us to infer something meaningful beyond descriptive statistics (Schutte, 1977). The Kruskal-Wallis test will determine if the data meets the criteria for the hypotheses. Next, the Wilcoxin Rank Sum test will compare those groups that fall outside of the hypothesis acceptance level. Finally, the Spearman Correlation examines the relationship between two chosen variables.

(1) Kruskal-Wallis Test. The Kruskal-Wallis is a "powerful and attractive nonparametric test for analyzing independent samples (Teng, 1978)." The Kruskal-Wallis tests how each program's rankings faired against each other per ASC. The Significance level was .10. The P-Value is the focus for accepting or rejecting the null (HO) hypotheis. Therefore, if the P-Value is less than .10, then the HO is rejected. The null (HO) and alternative (HA) hypothesis are as follows:

- HO: The location of all populations are the same
- HA: At least two population locations are different

A numerical sample was established for each program based upon a ranking order. The new samples for each program underwent the Kruskal-Wallis test based on the ASC's. Of the five tests conducted Realism and Flexibility showed they were significantly different because they rejected the HO. Both Realism and Flexibility have P-Values less than the .1 significance level with a value of .07 and .06, respectively as shown in Figure 16. The comparisons that show significance is highlighted. While the Kruskal-Wallis test can determine if there is a difference, it cannot predict which area that caused the actual difference to occur. The Wilcoxon-Rank Sum test can determine the actual area of the difference (Keller, 2009).

Realism

Kruskal-Wallis Test		
Group	Rank Sum	Observations
CNSF Web	76.5	5
TORIS	52.5	5
SHARP	54	5
CV SHARP	27	5
H Stat		7.02
df		3
p-value		0.0713
chi-squared Critical		7.8147

Stability

Kruskal-Wallis Test		
Group	Rank Sum	Observations
CNSF	131	7
TORIS	78	7
SHARP	99	7
CV SHARP	98	7
H Stat		3.0422
df		3
p-value		0.3852
chi-squared Critical		7.8147

Resource Balance

Kruskal-Wallis Test		
Group	Rank Sum	Observations
CNSF	24	3
TORIS	12	3
SHARP	24	3
CV SHARP	18	3
H Stat		2.5385
df		3
p-value		0.4684
chi-squared Critical		7.8147

Flexibility

Kruskal-Wallis Test		
Group	Rank Sum	Observations
CNSF	53.5	4
TORIS	19.5	4
SHARP	37	4
CV SHARP	26	4
H Stat		7.318
df		3
p-value		0.0624
chi-squared Critical		7.8147

Risk Management

Kruskal-Wallis Test		
Group	Rank Sum	Observations
CNSF	176	8
TORIS	106	8
SHARP	139	8
CV Sharp	107	8
H Stat		4.6676
df		3
p-value		0.1978
chi-squared Critical		7.8147

Figure 16. Kruskal-Wallis Test Results

(2) Wilcoxon Rank Sum Test. The Wilcoxon Rank Sum Test will compare the individual components for each independent group (Keller, 2009). The results from the Kruskal-Wallis Test indicate that both Realism and Flexibility were significantly different. The Wilcoxon Rank Sum Test will examine each program under the two variables to determine which areas caused the difference. The significance level was set at .10 and the null and alternative hypotheses are below:

- H0: The two population locations are the same.
- HA: The two populations are different (using the two sided HA).

(a) Realism. Figure 17 shows all of the Wilcoxon comparisons conducted for Realism and those with a significant difference are highlighted. Three of the six comparisons under realism showed a significant difference. CNSF Web reported their program as significantly more realistic than TORIS, SHARP, and CV SHARP. The P-values range from .02 to .08. Their rank sum comparisons are as follows:

- CNSF Web – 37 > TORIS – 18
- CNSF Web – 36 > SHARP – 19
- CNSF Web – 39 > CV SHARP - 16

Wilcoxon Rank Sum Test

	Rank Sum	Observations
CNSFWeb	37	5
TORIS	18	5
z Stat	1.9845	
P(Z<=z) one-tail	0.0236	
z Critical one-tail	1.2816	
P(Z<=z) two-tail	0.0472	
z Critical two-tail	1.6449	

Wilcoxon Rank Sum Test

	Rank Sum	Observations
CNSFWEB	36	5
SHARP	19	5
z Stat	1.7756	
P(Z<=z) one-tail	0.0379	
z Critical one-tail	1.2816	
P(Z<=z) two-tail	0.0758	
z Critical two-tail	1.6449	

Wilcoxon Rank Sum Test

	Rank Sum	Observations
TORIS	33.5	5
CVSHARP	21.5	5
z Stat	1.2534	
P(Z<=z) one-tail	0.105	
z Critical one-tail	1.2816	
P(Z<=z) two-tail	0.21	
z Critical two-tail	1.6449	

Wilcoxon Rank Sum Test

	Rank Sum	Observations
SHARP	34.5	5
CVSHARP	20.5	5
z Stat	1.4623	
P(Z<=z) one-tail	0.0718	
z Critical one-tail	1.2816	
P(Z<=z) two-tail	0.1436	
z Critical two-tail	1.6449	

Wilcoxon Rank Sum Test

	Rank Sum	Observations
CNSFWEB	39	5
CVSHARP	16	5
z Stat	2.4023	
P(Z<=z) one-tail	0.0081	
z Critical one-tail	1.2816	
P(Z<=z) two-tail	0.0162	
z Critical two-tail	1.6449	

Wilcoxon Rank Sum Test

	Rank Sum	Observations
TORIS	25.5	5
SHARP	29.5	5
z Stat	-0.4178	
P(Z<=z) one-tail	0.3381	
z Critical one-tail	1.2816	
P(Z<=z) two-tail	0.6762	
z Critical two-tail	1.6449	

Figure 17. Wilcoxon Rank Sum Test for Realism

(b) Flexibility. Figure 18 shows all of the comparisons conducted by the Willcoxon for Flexibility, with those showing a significant difference highlighted. Two of the six comparisons under flexibility showed a significant difference. Of the two comparisons CNSF Web rated their system as more flexible than TORIS or SHARP rated their system. The P-values range from .02 to .06. Their rank sum comparisons are as follows:

- CNSF Web – 26 > TORIS – 10
- CNSF Web – 24.5 > CV SHARP – 11.5

Wilcoxon Rank Sum Test

	Rank Sum	Observations
CNSFWEB	26	4
TORIS	10	4
z Stat	2.3094	
P(Z<=z) one-tail	0.0105	
z Critical one-tail	1.2816	
P(Z<=z) two-tail	0.021	
z Critical two-tail	1.6449	

Wilcoxon Rank Sum Test

	Rank Sum	Observations
CNSFWEB	23	4
SHARP	13	4
z Stat	1.4434	
P(Z<=z) one-tail	0.0745	
z Critical one-tail	1.2816	
P(Z<=z) two-tail	0.149	
z Critical two-tail	1.6449	

Wilcoxon Rank Sum Test

	Rank Sum	Observations
TORIS	13	4
SHARP	23	4
z Stat	-1.4434	
P(Z<=z) one-tail	0.0745	
z Critical one-tail	1.2816	
P(Z<=z) two-tail	0.149	
z Critical two-tail	1.6449	

Wilcoxon Rank Sum Test

	Rank Sum	Observations
TORIS	16.5	4
CVSHARP	19.5	4
z Stat	-0.433	
P(Z<=z) one-tail	0.3325	
z Critical one-tail	1.2816	
P(Z<=z) two-tail	0.665	
z Critical two-tail	1.6449	

Wilcoxon Rank Sum Test

	Rank Sum	Observations
SHARP	21	4
CVSHARP	15	4
z Stat	0.866	
P(Z<=z) one-tail	0.1932	
z Critical one-tail	1.2816	
P(Z<=z) two-tail	0.3864	
z Critical two-tail	1.6449	

Wilcoxon Rank Sum Test

	Rank Sum	Observations
CNSFWEB	24.5	4
CVSHARP	11.5	4
z Stat	1.8764	
P(Z<=z) one-tail	0.0303	
z Critical one-tail	1.2816	
P(Z<=z) two-tail	0.0606	
z Critical two-tail	1.6449	

Figure 18. Wilcoxon Rank Sum Test for Flexibility

(3) Spearman Rank Correlation. The Spearman Rank Correlation analyzes rank data. It measures how closely two sets of rankings agree with each other (Schutte, 1977). The results from this test are displayed below in Table 6. The closer the value is to one indicates how well the variables agree with one another. Since most of the

variables for this study are hardly related, it shows the diversified nature of the variables. The variables were used to evaluate the mindset involved in the development and operation of each program. This test adds validity to the evaluation variables because they cover different aspects of the programs.

	Realism	Stability	Resource Balance	Flexibility	Risk Management
Realism	1	-0.01	-0.06	0.32	0.27
Stability	-0.01	1	0.29	-0.09	-0.25
Resource Balance	-0.06	0.29	1	0.15	-0.21
Flexibility	0.32	-0.09	0.15	1	0.41
Risk Management	0.27	-0.25	-0.21	0.41	1

Table 6. Spearman Correlation Test

3. Results of Quantitative Analysis and Their Applicability to the Organization

a. Realism

(1) Survey results. Realism is the ability to set obtainable goals. From the analysis, three areas present feedback on how realism is addressed. First, Figure 15 displays how the Kruskal-Wallis Test showed realism was significantly different because it rejected the HO. This indicated that these results did not come from a random chance of occurrence. Secondly, Figure 16 depicts how the Wilcoxon- Rank Sum tests the way each organization responded to the realism questions. Three areas showed a significant difference. CNSF Web reported their program as significantly more realistic than TORIS and CV SHARP. Third, Figure 13 showed how the lack of a knowledgeable expert made certification difficult, indicating a need for a commodity manager or team of experts to oversee technological changes.

(2) Organizational patterns. The programs examined in this study showed similar behaviors that realism techniques can improve. First, all of the programs have a change management approval process, but it resides at the program level. Decisions at the program level should fit into the organization's goals for a funding strategy. Additionally, due to the requirements-driven nature of the programs, it is difficult to establish goals for an operational baseline. Establishing a baseline will provide a core process that must be funded from year to year. Third, future program vision is needed in order to create version control. The plan for future versions assist in funding request justifications and provides a visual that shows how a program evolves from a basic capability to a more responsive and robust program.

b. Stability

(1) Survey results. Stability exists when an organization can overcome negative disruptions that affect cost, schedule, and performance requirements. The results from the mean of the overall survey, Table 5, revealed that SHARP was most often rated between 1 and 3. This rating indicated Program Managers' confidence in their ability to maintain stable operations in the midst of changes. In Table 5, the mean and the standard deviation comparison show a high variability in stability for all programs. This indicates that guidance in increasing stability may need to be a future focus.

(2) Organizational patterns. With the programs in this study, variability could be high since most of them are in a continuous maintenance mode that consists of adding new capability while trying to resolve current problems. This shows that the programs are viable and in a responsive mode to meet operational requirements. The underlining thought is that there is no hard reference point to where the programs started, currently reside, or future capability.

c. Resource Balance

(1) Survey Results. Resource balance accounts for the use of resources to meet requirements. Early in the analysis, Figure 13 depicted the procurement challenges with each program. These programs developed out of an

operational need or a directed study. Their existence has already proven to be worthy; therefore, a sustaining funding vehicle is needed. Table 5, the mean and standard deviation analysis, showed zero variability for CNSF WEB and SHARP for Resource Balance, indicating the participants rated the balance for resources and requirements as significant and important.

(2) Organizational Patterns. Observations of the organizations show similar behaviors. Most seem to operate from a single funding line which is good from a control perspective. But when funding level reductions are mandated, it would be helpful to have an idea of what services could be discontinued with little impact on organizational performance. Additionally, the funding vision for how to best leverage the funds for future efficiencies seem to be short term. Another observation is that managers that control a single funding line seem to be reactive, versus proactive, to environmental changes. These challenges emerge out of the concern for changes in the funding levels. A dedicated funding vehicle could address these challenges. A funding plan will not make the problems disappear, but it could provide leverage for decision making over the long term.

d. Flexibility

(1) Survey Results. Flexibility consists of the ease with which changes and failures can be accommodated without significant changes in resources requirements. Figure 13 shows ratings for both TORIS and CVSHARP, indicating concern for external factors affecting their program's operation and growth by showing concern for changes in their customer, policy, and requirements. Figure 16 shows the Wilcoxin-Rank Sum tests results for the way the participants responded to the Flexibility questions. Two comparisons showed a significant difference. CNSF Web rated their system as more flexible than TORIS or SHARP rated their system.

(2) Organizational patterns. Flexibility focuses on how resources are used to meet requirements. Changes are made as requirements develop and funding is not always considered. TORIS users pay into the program by being taxed. So when a requirement emerged, there was no additional funding. SHARP has an annual budget for current operations. Their users fund any new capabilities.

e. Risk Management

(1) Survey Results. Risk Management centers on proactively determining ways to mitigate risk from external and internal factors that affect cost, schedule, and performance. In Figure 13, CNSF Web rated their program as having moderate to little impact from risk factors. This shows confidence in their Web based program to operate well in spite of changes. In Table 5, Risk Management showed a high level of variability for all programs. This is an indication that training on the importance of risk management should be a future focus.

(2) Organizational Patterns. Variability in risk management indicates that those surveyed do not view it the same way. The idea of managing risk is to identify the risk and set measures in place to reduce the impact of their occurrence. The programs are managed with similar behaviors. Most programs are using the same contractor or have used one contractor for the majority of their programs existence. This could be good because the contractor would have an understanding of the program from the beginning. The risk worth identifying is what will happen if this contractor is replaced. To mitigate this risk, the organization should take actions similar to the following:

- Obtain and update current documentation detailing how the program operates, where the data is stored, and data retrieval steps
- Have their contractors sign statement of nondisclosure for information critical to the organization.
- Have some government employees trained on how the program works
- Create metrics for measuring both the contractor and the programs' performance.

f. Topics Applicable to All ASCs

(1) Survey Results. Some of the analysis presented overarching ideas. In Figure 11, The Mean rating from those surveyed for TORIS was 1.81 with a standard error of .15. This is an indication that they have a strong sense of operational satisfaction and view the impacts of changes to their program as important. While from

the same figure, the mean rating from those surveyed for CNSF Web was 3 with a standard error of .19. This is an indication that they have a moderate view of impacts on their program. Finally, in Table 6 the Spearman Correlations indicated that most of the variables for this study are hardly related. This is significant because it shows the diversified nature of the variables used to evaluate these programs. This ultimately gives credibility to the overall study for reviewing these programs from different perspectives.

(2) Organizational Patterns. Overall, the goals of the programs are to provide accurate, timely, and widely assessable proficiency statuses into the DRRS-N. The program managers have a heightened sense of concern for satisfying user requirements, meeting customer needs, and reporting the status of the war fighting equipment.

C. QUALITATIVE ANALYSIS OF CNSF AND CNAF ACQUISITION STRUCTURE AND DECISIONS

1. Comparison of Commander, Naval Surface Force (CNSF) and Commander, Naval Air Forces (CNAF) Organizational Values on IS Acquisition decision making

Understanding an organization's culture and priorities is critical to the successful implementation of any strategic plan or change initiative. To begin the strategic planning process, an organization must assess its values, core processes, and goals (Fisher, 2010). The CNSF mission is to support the SWE in its effort to provide "warships ready for tasking." Therefore, its core mission areas deal with promoting and tracking superior operational readiness of the fleet at all times. The Navy's progression toward warfare enterprises is centered on the concept of alignment with the purpose to provide continuous mission capability at lower cost. The Type Commander (TYCOM), Supporters, and Providers are aligned to meet the tasking requirements for the Enterprise. Through superior training and readiness CNSF strives to "provide operational commanders with well-trained, highly effective, and technologically superior surface ships and Sailors" (Surface Warfare Enterprise, 2010). However, CNSF also states that in order to obtain this goal, a "significant level of adaptability and flexibility" is required. CNSF is a mission-focused organization whose strategic approach to acquisition of

Information Systems (IS) must be flexible and adaptable to dynamic requirements and evolving mission needs. Based on conversations with CNSF program managers, processes that are at the core of CNSF business are:

- Ensuring operational readiness of surface forces is met
- Ensuring manning requirements of surface forces are met
- Ensuring surface forces have the latest and most effective technology
- Tracking and Reporting operational training and readiness
- Collaboration with various Fleet Readiness Enterprise (FRE) components

Although CNSF Information Systems must be adaptable and flexible, the processes that are core to completing its mission remain static. The command requires adaptable and flexible systems that will allow them to execute their mission efficiently and effectively. However, it is important to note, while IS are vital to CNSF executing core mission areas, IS decision making is not a high level priority in the command's strategic vision. This is largely due to the command's lack of IS strategy, nor a strategic vision for the acquisition of systems and services needed to maintain their current IS posture or make future improvements.

Currently, CNSF is annually funding $2.2M for Training and Operational Readiness Information Service (TORIS) from monies allocated for ships' operations (Ship Ops). Ship Ops money is redirected from every ship in the surface force to fund TORIS upgrades, development, and maintenance. As a result, ship Commanding Officers (COs) may have to deal with budgeting shortfalls in various areas during daily shipboard operations. For example, when ships need repair parts or consumable items such as a motor for a refrigeration system or toilet paper the CO may be forced to wait for that vital repair part or redirect funding from other area of his Operational Target (OPTAR). Since money for funding the operational units is targeted first when funding TORIS contracts, surface units are forced to maintain their level of readiness with fewer resources. Although TORIS is a vital program to the operational commander, the program and the surface forces may be better served if the funding for the system was its own budget line item.

While the TORIS program was initially designed to track and report readiness of the surface fleet, it has proven to have useful capabilities far beyond its original purpose. TORIS not only provides contracted Analysts with vital metrics on fleet readiness, it also automates routine administrative functions for the ATG command, such as electronic mustering, automating sea pay activities for shipboard trainers, and electronic tracking of administrative correspondence. These added capabilities reveal the value of the system, and foreshadow of usefulness that is yet to be realized. TORIS output data has been requested by organizations other than those within the SWE. According to TORIS Program Contractors, the Navy Staff (OPNAV) and the US Coast Guard (USCG) also use TORIS to supplement their own awareness on various action items within their organizations.

TORIS was initially acquired under an evolutionary acquisition strategy and developed using a spiral method. This method was chosen because the requirements of the system were not clearly stated and the end-state of the system was unknown. According to one of the original TORIS developers, "TORIS was implemented as a cost savings measure. When the acquisition strategy was designed we [TORIS Development Team] did not know what we did not know. The problem was not well defined. [Therefore], developing with the philosophy of maintaining agility in both programming and project management approach, we were able to produce TORIS as a global system deployed to every ship for a fraction of the cost of any other comparable system." This approach yielded a quality product that has met its goals of cost-savings. The system continues to use this approach of spiral development to achieve further capability to meet continually evolving user requirements.

Changes to the TORIS configuration are vetted through a Configuration Control Board (CCB), which oversees and approves changes in the various data views and functionality of the system. The CCB is made up of the Afloat Training Group (ATG) Commodores and N7 (Training and Readiness Department Heads) from the various ATG commands in the fleet. This board meets periodically to discuss new requirements for training and readiness for the fleet. The requirements from the CCB are passed on to the system developers who add the coding necessary to achieve the desired system functionality.

Collaboration is vital to CNSF support of the SWE. CNSF Web allows for CNSF to disseminate policy documentation to surface units. SURFORWEB also serves as a central location for knowledge management resources critical to successful execution of shipboard missions. SURFORWEB serves as a centralized information repository for units to access. However, it is important to note that CNSF Web is not a critical system for ships to get underway and execute mission requirements. Although the program supports the SWE vision of collaboration and alignment throughout the enterprise, there is no financial data to support a cost-benefit analysis for determination of a return on investment (ROI). This presents an issue for the command when faced with decisions of where to cut costs and decrease or increase spending on IS assets. Previous iterations of SURFORWEB supported staffs and infrastructure on both coasts at Commander, Naval Surface Forces Pacific (CNSP) and Commander, Naval Surface Forces Atlantic (CNSL) under multiple contracts. Recently these contracts were migrated under one umbrella contract supporting SURFORWEB manning and infrastructure at CNSL.

CNSF acquisition of the TORIS and SURFORWEB programs was a result of organizational priorities of mission accomplishment, through enterprise collaboration and alignment. However, decision makers did not fully consider what cost efficiencies, if any, would be provided by these systems. Neither system has cited any key performance parameters for cost savings. The lack of considering cost saving when acquiring fails to leverage the cost benefits of an enterprise organizational strategy. CNSF desires systems that will support their mission requirements while maintaining a level of adaptability for future capability as indicated by the dynamic state of the TORIS program. While SURFORWEB contribution to CNSF mission is evident, its return on investment, if any, has yet to be discovered.

a. CNAF IS Programs

The SHARP program tracks readiness of the aviation force down to individual level. Commander, Naval Air Forces (CNAF) is tasked with monitoring readiness of both the carrier fleet and the individuals that make up the squadrons' flight crews. The SHARP program has utilized the same contractor since its inception. The value that SHARP adds to CNAF is considerable. The TYCOM has a view into the Navy's air force enterprise down to the individual level so that it may tailor training requirements to provide the greatest benefit to the aircrews that make up the various squadrons throughout the fleet.

Much like the TORIS program, the Carrier Sierra Hotel Aviation Readiness Program (CV SHARP) tracks training and operational readiness of the Carrier fleet. CV SHARP is an evolutionary acquired program that has been developed through increments. Since its initial development CV SHARP has been a funding priority for CNAF. However, similar to CNSF, CNAF funding for CV SHARP comes from monies allocated for the Flight Hours Program (FHP). Similar to Ship's Operating (Ships Ops) funds, FHP funds pay for the numerous aspects associated with flight operations (i.e., maintenance, fueling, training, etc.,) CNAF priorities are similar to those of CNSF. Supporting the NAE through training and operational readiness of all naval aviation assets is top priority. CV SHARP uses a Change Control Board (CCB) to vet functional changes within the programs. However, The Program Manager (PM) has final decision authority before any changes can be made to the system. According to the PM, "All software development requirements are written in a Customer Acceptance Document, which lists all of the requirements for that iteration and the timeline associated with it" (CV SHARP Program Manager, 2010). The CCB allows for version control of the program aids in prohibiting increasing program requirements and avoiding budget overruns. Research into the CV SHARP system acquisition did not yield indications of cost-savings metrics or key performance parameters for savings.

2. Merging Acquisition Strategies with CNSF Organizational Values

CNSF requires Information Systems (IS) that support the readiness of the operational forces and support SWE requirements. Acquisition of these IS systems must converge with organizational values to ensure a seamless integration of the system into the organization, and that the greatest value is being attained through the systems use. This section will discuss how various IS acquisition strategies can be used to incorporate CNSF organizational priorities. While there will not be a single strategy that will address all organizational priorities, there are benefits inherent in each strategy that can best achieve certain command priorities.

a. Evolutionary Acquisition Strategy (EAS)

A key factor when considering an EAS is the reduction of time it takes to deliver an initial operating capability (IOC) to the fleet. For a command tasked with facilitating and maintaining operational readiness, reduced cycle time should be a priority. Reduced cycle time is due in part, to leveraging mature technologies either from the private or government sector. SURFORWEB is built on the Microsoft SharePoint software program. The benefit of enhanced granularity of requirements inherent within the EAS can provide a benefit to organizations that require information systems but are uncertain of what their needs are. The incremental development process used in the EAS provides the flexibility that CNSF needs to meet dynamic capability requirements. Subsequent versions of the IS can include configuration changes.

b. Product Line Acquisition

CNSF is a geographically dispersed organization whose IS requirements to execute its core mission processes may be well served using PLA. The core asset development function, as discussed in chapter two, inherent within the PLA strategy would prove beneficial to an organization whose mission is top priority. Ultimately, a product could be developed as a result of core asset development and management. Currently, the CNSF IS architecture is not well defined and lacks a strategic vision. PLA offers the benefits of developing products that can seamlessly integrate into a well-defined architecture. Additionally, Software reuse from proven systems can offer a cost savings in time and value for the command. One of the cost savings initiatives of TORIS was its capability to allow for manning decreases of up to 40 percent. Greater efficiency in using human resources is a benefit of PLA as discussed in chapter two. This approach would require the command to execute a detailed assessment of their Information System priorities, and determine how these priorities and there is needs will fit to enhance core processes, and provide capability for future process changes.

c. Performance Based Services Acquisition (PBSA)

A primary benefit of PBSA is improved quality and better value. An IS that provides value to the command's mission is an organizational priority for CNSF. Therefore instituting an acquisition strategy that requires high quality performance from contractors in developing those systems would offer benefit to the command. This strategy would require clear requirements in order to facilitate a clear statement of work (SOW). CNSF requires measurable outcomes of contractor and system performance to assist in making spending decisions. A benefit of PBSA is that contractors are measured according to value criteria that the command determines. In this strategy a cost savings is realized through competition and innovation. CNSF would simply provide system performance requirements and the contractor would assume the risk in meeting them. Figure 19 is a re-creation from the Bridge Technology Corporation training on PBSA, displays the relationship between the various components in PBSA.

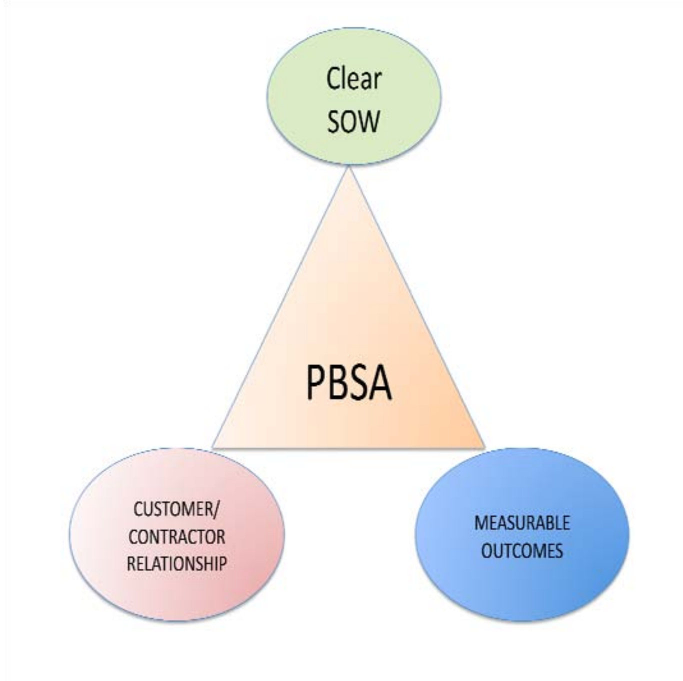

Figure 19. Relationship of components in PBSA (After PBSA Training, Berendt, 2005)

The greatest benefits for a command such as CNSF, are the measurable outcomes. SURFORWEB currently has no performance outcome to measure whether all objectives are being met, or that contractor performance is at some benchmark of acceptance.

3. GAO Case Study of Commercial Transformation in Decision Making on IS Acquisition Spending (Case Study Located in Appendix C)

a. Introduction

The government Accountability Office (GAO) conducted a study of six companies from the commercial industry in order to capture lessons learned on how they evolved from traditional to strategic service acquisitions. Strategic decision making was based upon four concepts:

- Any change effort must have top-level leader support
- The organization should obtain financial knowledge through conducting a detailed spend analysis

- An organization must create the structure, processes, and roles for strategic decision making
- There must be sustained leader support, open communication channels, and credible metrics for compliance validation

By embracing these four concepts, the organizations in this study were able to better leverage their resources, reduce their operating costs, better manage their service providers, and gain better quality from services rendered.

Early in the process, the companies realized that they lack money flow control for acquiring services. Additionally, decision making for the acquisition of services was left to individual units such as finance, engineering, human resources, and maintenance, without top-level intervention or expert evaluation which hindered the ability to make coordinated decisions across the organization. Additionally, there were no tools to measure the services' ability to meet company needs. Four general principles emerged as the most critical for achieving a strategic approach to purchasing services:

- Secure up front commitment from top leaders
- Obtain improved knowledge on service spending
- Create supporting structure, processes, and roles
- Enable success through sustained leadership, communication, and metrics

(1) Senior Leadership Involvement. Senior leadership involvement from the beginning was paramount to the success of the change initiative. The leaders provided direction, vision, and supervised the development of a common process approach. In some cases, leaders associated their name to new ventures in order to secure buy-in.

The shift from a traditional to strategic decision-making approach required active participation from senior leaders. For example, traditionally, services belonged to one business section, while strategically they are viewed centrally. Examining how change occurs; traditional managers are not active participants. But, strategically, they provide direction and vision, by providing goals, targets, and feedback on achieving them.

It is important to have senior leaders spearheading reengineering efforts because they have the authority to direct support, the responsibility to set corporate agenda, and the power to remove barriers that block change. Previous research has documented that the failure of reengineering efforts are largely attributed to the lack of top management commitment.

(2) Spending Analysis. To gain knowledge on current trends in IS spending; a spending analysis should be conducted. In this case study the spending analysis was initially used to determine how much was being spent for services and to whom was it paid. The analysis revealed that the companies in the study were buying similar services from numerous providers, at often times varying prices. To make strategic decisions, they would have to develop a deliberate approach to planning and managing their acquisitions.

Strategically approaching acquisition decision making focused on developing credible, reliable, and timely data on services acquired. Strategically, data is used to find opportunities that will rationalize the supplier base and reduce costs, instead of being used as an after-the-fact reporting tool. A spend analysis should identify the following:

- What types of services are being acquired?
- How many suppliers for a specific service the company is using?
- How much they are spending for that service, in total and with each supplier?
- Which units within the company are purchasing the services?

(3) Structure, Processes, and Roles. To achieve an enterprise perspective, the companies revamped their procedures for acquiring services in terms of their structure, processes, and roles. Initially, their traditional structure hindered their ability to coordinate across their organizations. To alleviate this obstacle the companies changed their structures. They made three major changes:

- Elevated and/or expanded the role of the company's procurement organization.
- Established cross-functional teams with a mix of knowledge, expertise, and credibility.
- Established dedicated commodity managers to oversee key services.

The implemented changes evolved their role from one of resourcing to that of advisory.

(4) Sustained Leadership, Communication, and Metrics. Resistance and cultural barriers hindered the companies' reengineering efforts. Three critical elements for overcoming these challenges were identified. First, leadership support must be sustained throughout the life of the project. Second, open communication lines must exist between the business units and the purchasing organization. Finally, credible metrics should be used to add validity to organizational decisions.

b. Conclusion/Summary

The companies in the GAO study recognized that there was a gap between their core business processes and their consideration of the IS as a core asset. This was evident at the amount of cash outflows they experienced for duplicated services. DoD components such as CNSF are at a similar crossroads, wherein it is necessary for organizations like CNSF to take a more strategic approach toward spending in the realm of IS. Gaining greater knowledge on how monies are spent in IS acquisition will fuel more strategic thinking for acquisition decision makers. A successful change initiative must begin from the top and be pushed down to the subordinate organization. This top-level leadership support must be maintained throughout the transformation.

4. Findings on CNSF Shortfalls in Strategic IS Acquisition

a. Lack of Strategic IS vision

In this chapter, it has been stated that CNSF does not have a strategic vision of its information systems infrastructure. This lack of an IS strategy causes a gap in the command's ability to make meaningful decisions for spending to better leverage its

IS capability. CNSF must identify how IS fits within its core business processes. Additionally, the core processes must be prioritized to match organizational values and goals before the command can strategically approach the acquisition of further IS services and capabilities. Although CNSF has been successful at utilizing IS to complete its mission requirements it is incurring greater costs in order to do so. The possibility of looming budget cuts is driving the command to give greater consideration to IS spending. Ultimately the goal is to maintain current mission capability at a lower cost. A robust and detailed IS vision will provide the framework for CNSF IS infrastructure. It will provide organizational decision makers with a frame to understand what is being acquired and how it fits in the organization's overall mission. Ultimately, enabling CNSF to better support the SWE.

b. IS is a Mission Enabler Not a Priority

IS, such as TORIS and SURFORWEB, are essential applications to effective mission accomplishment and cost-savings for CNSF. However, the command did not begin to consider them as such until spending trends in the IS realm began to make a noticeable increase. Much like CNAF and the companies discussed in the case study, CNSF views IS as a mission enabler and not central to the organization's success. This is evident in the lack of an executive level IS advisor such as a Chief Information Officer (CIO). There is no top-level IS commodity executive with detailed knowledge of mission requirements, fiscal understanding, guided by a strategic IS vision to advise command leadership on how to best fund IS programs to most-effectively meet the mission goals, for the best value.

c. IS Programs Lack Metrics for Return on Investment (ROI)

The programs observed in this study were all developed to perform specific functions to meet CNSF mission requirements. While the programs are effective in executing these requirements, none were designed with output for ROI metrics in mind. CNSF wishes to analyze where its funding is best applied to better leverage its IS capability. However, without proper metrics the decision on where to increase or decrease funding is difficult at best. Therefore CNSF does not truly understand the value that they are receiving from utilizing IS. There are currently no metrics or key performance factors for any of the systems reviewed in the study. These performance measurements also extend to the contractors tasked with developing and maintaining the systems. There is currently a lack of review of contractor performance to ensure quality and contract value.

d. ASC Improvement Measures

(1) Realism. Realism focuses on setting attainable goals (ASC document). Organizational goals need to align both operational and financial requirements. An option for achieving operational goal setting is through establishing a baseline that contains core processes. By establishing this baseline, fund managers can better earmark dollars for the daily mission. Additionally, by packaging new capabilities that can be accomplished in one to two years, funding can be allocated for that particular purpose.

(2) Stability. Stability centers on overcoming negative influences and disruptions. Factors exist that work against achieving it and in support of it. Stability is best achieved through a dedicated structure that offers direction, advocacy, and commitment. Several options emerge. First, a CIO will provide direction and a focus agenda for achieving organizational goals. A CIO is only effective when the second point exist: top level commitment to the efficient use of IS resources. The leaders must be the voice in the command that requires compliance on the part of its employees. Third, an organization could also assemble a group of technological experts that understand technology requirements and funding constraints.

(3) Resource Balance. The balance of resources against requirements can be achieved with internal and external techniques. An external technique could be by becoming a part of a larger buying program that allows them to purchase the same items but at smaller costs because they are purchasing along side of several other organization. Collectively they receive a discount because of quantity. This approach is used by the DON. The DON uses Department of Defense (DoD) Enterprise Software Initiative (DoD ESI) and the Federal SmartBUY for commercial IS purchases (Enterprise Software Initiative, 2009). An internal approach could be through

conducting a spend analysis. This type of analysis will indicate what types of services are being acquired. It could also tell you how many suppliers exist for a specific service within the same company. It could also provide insight into how much is being spent for a service, a total amount, and to each supplier. Lastly, the test could also tell you which units within the organization are purchasing these services.

(4) Flexibility. Flexibility is the organizations ability to accommodate changes and failures with minimal impact on resource requirements. A solution on how to achieve flexibility may reside in different areas. By establishing a baseline and conducting version control, the budget could be established to align with it. This helps to project funding requirements and increase the opportunity to be proactive in the anticipation of changes. Another option is to establish a funding line for core processes and share the financial burden of additional requirements. Lastly, establishing metrics for measuring the continued need for system capabilities is a way to keep the program viable and connected to its user community.

(5) Risk Management. Risk management is based on mitigating risk that affects cost, schedule, and performance. Solutions that have already been mention can also serve here. Solutions like setting attainable goals, establishing a baseline, and incorporating version control can also work to mitigate risk. Another idea rests with measuring performance and knowing when milestones have been achieved. These measures empower the organization to be proactive in their decision making, an enhanced ability to manage provided services, and an audit trail for spending.

D. SUMMARY

This chapter presented qualitative and quantitative analysis of CNSF. The study presented a comparison of CNSF organizational values with a similar TYCOM CNAF. Ultimately mission accomplishment is CNSF main priority. However, since IS has not been placed as a priority the command has not instituted processes to identify metrics to provide ROI data required to begin discovering where to cut or increase spending within its IS infrastructure. A well-defined IS strategy, an executive level IS Advisor, and a thorough prioritization of organizational values with IS requirements are necessary to begin making lasting decisions concerning strategic IS acquisitions.

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V. CONCLUSIONS AND RECOMMENDATIONS

A. SUMMARY OF RESEARCH

The focus of this thesis was to examine CNSF current strategic approach to the acquisition of information systems (IS) and services. This research was the culmination of a 3-part project in the development of a cost effective information technology (IT) strategy for CNSF. Part of the CNSF system research was based on a baseline assessment of the command conducted by the first group in the study. This information included the functionality and background of the systems as well as the current command spending on system development and maintenance. The IS strategy that was discussed in chapter two was based on the IS strategy recommendation made by the second group. Enterprise Architecture was discussed to match the Navy's current strategic approach to utilizing and leveraging IS to meet current mission needs. Chapter two focused on defining current acquisition strategies that are utilized by the DoD. Chapter three described CNSF systems, the organizational structure, and its current mission. Additionally, Commander, Naval Air Forces (CNAF) was introduced as a similar organization in order to provide a comparison of organizational values and approach to IS acquisition which was presented and discussed in chapter four. Chapter four presented both qualitative and quantitative analysis of the command's values, and provided evaluation of the command's shortfalls when considering the acquisition and spending on IS and services. These shortfalls provide areas of improvement for CNSF as it progresses toward a more strategic consideration of IS as a mission priority.

This chapter will present conclusions based on the research and discussions with program decision makers and managers, as well as successful methods utilized in the acquisition of IS for similar organizations. This chapter will also make recommendations to assist CNSF decision makers in making improvements in the areas identified as shortfalls, and ultimately lead to achieving a more strategic approach to the acquisition of IS.

B. CONCLUSIONS

1. Research Question Findings

Which Strategic Approach to IS acquisitions broadly supports both CNSF missions and business practices?

Since CNSF does not currently have an IS strategy that is paired with its organizational values and needs, it is difficult to identify a single acquisition strategy that will meet all of its objectives and requirements. However, in its support of the Surface Warfare Enterprise (SWE), which ultimately requires that "warships are ready for tasking," any IS strategy can be instituted as long as it effectively supports that primary objective. As an organization, CNSF is taking the appropriate steps to becoming more aware of how to strategically acquire IS. According to the GAO case study discussed in Chapter four, commercial companies obtained greater knowledge and understanding of IS and IS spending on their way to achieving strategic IS acquisitions. Simply requesting that this three-part study be completed displays a shift to a more strategic view of the priority of IS within business processes and its acquisition.

However, there are proven strategies that are utilized within the DoD that can be leveraged by CNSF to better provide a framework for acquisition decision making. According to the DoD 5000.2, Evolutionary Acquisition Strategy (EAS) has been touted as the acquisition approach of choice for the Department of Defense (DoD). EAS allows for incremental development of systems to meet the dynamic requirements inherent in the realm of warfare. Although CNSF responsibilities of manning, training, and equipping the surface forces are set, how these responsibilities are executed changes according to the need and threat. Within EAS, CNSF should utilize a Modular Open Systems Approach (MOSA) to allow future upgraded technologies to be integrated with current systems. Open systems utilize open standards that are accepted throughout commercial industry, to ease interface between disparate systems current and future, to accommodate maturing and newly developed technologies.

Quantitative results indicated that flexibility in requirements as a program advantage. Primarily, requirements flexibility was used in the incremental development of the TORIS system. Requirements flexibility in an EAS will allow CNSF to strategically acquire information systems that are capable of meeting both current and future needs as they evolve, prior to final contract delivery.

Product Line Acquisition (PLA) could prove to be an effective strategy for CNSF. However, this approach would require detailed knowledge of core processes and competencies within the command. CNSF would develop IS product(s) based on these core processes. But to successfully execute PLA, the organization would have to first recognize its architecture. In other words, "procuring only an architecture in the first stage, procuring other core assets in the second stage, and procuring products (built from the core asset base) in the third stage (SEI, 2010)." Before CNSF can institute a product line, it must ensure that it has specific business goals, and the product line and architecture specifically align with those goals. The command can realize a cost-savings by instituting PLA in the following areas:

- Identification and development of an architecture
- The capability to leverage software reuse in the development of software interfaces and products
- More efficient use of human capital
- Cost estimations and metrics can be reused throughout the architecture once they are completed for one product

The Acquisition Strategy Characteristic (ASC) realism is achieved by PLA's development of an architecture. Developing a detailed architecture provides a framework to identify whether organizational goals are attainable for its architecture. If the organization understands its current state, it can better make strategic decisions concerning the integration of current legacy systems and how to best develop a software product that will supplant it in the future. Reuse allows the command to leverage proven technology and code to include in other core asset products. This method saves on code development and produces a software product that will integrate more seamlessly into the architecture, allowing for improved system stability when new capabilities and functionality is required in the system. Based on the statistical data discussed in Chapter four, Program Managers expressed that resources are of significant importance to successfully developing and implementing their systems. The command has placed significant value on the funding resource, hence the commissioning of this three part study. PLA addresses this concern by allowing greater efficiency in the use of human resources and cost. Since systems are developed using previously proven components, the time and cost associated with training personnel to operate and maintain subsequent systems is considerably decreased, freeing up resources that can be leveraged in other areas of command programs.

Performance-Based Services Acquisition (PBSA) will assist CNSF in getting the best quality performance from systems contractors through the use of incentives. However, it must meet the commands needs for performance metrics and cost-benefit data required to make funding decisions. There is no single acquisition strategy that will meet all CNSF requirements. However, certain elements of the three strategies discussed in this study will certainly get the command closer to the strategic decision making necessary to leverage its spending more efficiently and realize the most benefit in accomplishing mission goals. CNSF should consider their current organizational values and goals, technology architecture, and programs. With this information in mind, progress toward the development of systems that is founded upon proven systems and services that are already being used within the command. Aspects of the PLA hold several benefits for the command, specifically in meeting its concerns for long-term cost-savings.

CNSF requires an acquisition strategy that will allow it to acquire quality products and services that have been commercially proven, from contractors that will provide high quality performance and support, at the best value for the command. The strategy should allow incremental product delivery to address technology maturation for further capability with standards that are open to facilitate interface with legacy and disparate systems.

What are the different IS Acquisition approaches?

There are several acquisition approaches that can be instituted to acquire systems and services. Aspects specific to these various approaches can be used a la carte to develop a tailored acquisition strategy that will meet specific organizational system requirements. In Chapter II of this study, three acquisition strategies were presented and discussed to provide a framework for which CNSF could use for consideration, when strategically approaching the acquisition process necessary for developing and maintaining information systems meant to both enable and enhance core business processes. The acquisition strategies presented were:

- Evolutionary Acquisition
- Product Line Acquisition
- Performance-Based Acquisition

What types of Acquisition Approaches do other organizations with similar structures use?

This research study compared two TYCOMs with similar responsibilities and information systems. Commander, Naval Air Forces (CNAF) and CNSF both use software intensive programs to track, process, and report operational training and readiness in accordance with guidance and responsibilities provided by CUSFCC Fleet Readiness Plan. These systems: SHARP, CV SHARP, and TORIS provide an input training "T" pillar via DRRS-N to report the readiness status of the Navy's Air and Surface Forces. The study revealed similar acquisition approaches between the two organizations. TORIS was spirally developed under an Evolutionary Acquisition Strategy (EAS) and SHARP and CV SHARP were acquired under the same approach. However, SHARP and CV SHARP were and are still currently being developed incrementally.

Quantitative analysis also revealed that Program Managers of the studied systems dealt with similar obstacles in the acquisition and sustainment of their programs. The competition for resources was a common finding among the programs.

The government Accountability Office (GAO) case study that was also presented, analyzed the acquisition approach to information systems of four different companies from the commercial sector. Each company presented was a leader in a different industry. These companies' goals were to be the best in their industry and better leverage their Information Systems (IS) capability to reduce cost. While these organizations may not have been structured exactly as the TYCOMs, their goals are similar. The case study revealed that these organizations had to significantly restructure themselves and elevate their priority of IS from a traditional to a more strategic approach.

How do similar organizations measure ROI in their programs?

The TYCOMs presented during this study maintained little to no financial data that could be analyzed for cost-benefit or ROI. The CV SHARP and TORIS programs are facing the same concerns that are looming for the financial stakeholders at CNSF, which is the possibility of large budget cutbacks in forthcoming fiscal years. Although the TORIS program has proven to add value well beyond the capabilities for which it was initially developed, it was not implemented for the explicit purpose of adding cost-savings to CNSF. The organizations presented in the case study measured ROI against their core mission requirements and overall business success through the use of information systems.

C. RECOMMENDATIONS FOR CNSF

1. Establish a Chief Information Officer (CIO) position

An area of concern for CNSF is how to prioritize spending on IS to meet mission requirements. The organization requires a framework for which to align mission requirements, IS capabilities, and financial concerns. Currently, there is not enough knowledgeable guidance within the organization to balance these issues. A CIO, with the authority and support of top-level management, will assist the command in identifying spending priorities as they relate to the overall mission, and balance those priorities with current and future IS capabilities and any fiscal concerns to ensure best value and resource balance for the command. The CIO would ensure CNSF has a robust and relevant IS vision and resulting strategy, to guide the acquisition of information systems and capabilities. Additionally, the CIO would serve as a liaison between the technology centered Information Technology (IT) staff, the system contractors, and the financial professionals within the command to ensure all personnel involved with the acquisition of IS understand relevant and emergent concerns.

The CIO can either be civilian or military. But the individual must have proven detailed knowledge of information systems technology, the fiscal and budgetary process, and the acquisition process. If the position is to be filled using a military member, it is recommended that they are a senior-level officer, such as an O-6 or O-7. In the event that a civilian is chosen to fill the position, that individual should not be contracted, but instead have considerable experience with IS program management as a government-servant.

2. Establish a Commodity Managers Advisory Board (CMAB) for IS Acquisitions

In addition to the establishment of a CIO position within CNSF, it is further recommended that CNSF establish an advisory board of commodity manager to serve as guiding panel to the CIO and senior level management. This board would advise on issues pertaining to the acquisition of IS and capabilities to ensure the many departments and supporting mission areas that add to CNSF mission execution are considered. The CMAB should include representatives from the various core mission areas within the command. Program Managers from the various IS programs should be included as well. The purpose of this Board is to provide the CIO with relevant and emergent information to assist in formulating policy and guidance necessary for stakeholders to make spending, and functionality decisions for the command.

3. Consideration of Implementation Steps to Progress From A Traditional to Strategic Approach to IS Acquisition Decision Making.

The information in this recommendation relates to Figure 19. This section will provide a detailed explanation of the Figure 19 graphic and provide guidance for the command through each step to assist in its implementation.

An Enterprise Architecture (EA) is the recommended Information Systems (IS) Strategy that will provide CNSF with the ability to ensure that its IS will evolve in support of its war time mission. The recommended Acquisition Strategy that will enable this effort is the Evolutionary Acquisition of a Software Product Line. This strategy will be implemented incrementally using Performance Based Specifications. The Performance based specifications follow six disciplines and they are as follows :

- Top-Down support of strategic decision making--Proactively manage the organizational changes integral to the success of the initiative
- Strategic Linkage--Provide a consistent vision throughout the organization, making sure the desired results reflect organizational strategic goals
- Governance--Establish roles, responsibilities, and decision-making authorities for project implementation
- Communications--Identify the content, medium, and frequency of information flow to all stakeholders
- Risk Management--Identify, assess, monitor, and manage risks
- Performance Monitoring--Analyze and report status--cost, schedule, and performance--on a regularly scheduled basis during project execution

This recommendation evolved from several tasks that are discussed and depicted in Figure 20. This study identified the possible AS that could best support an EA. The amount of the Acquisition Strategic Characteristics that currently exists was examined. Third, this thesis incorporates a case study which discusses how to evolve from making traditional decisions to strategic decisions. The consolidated outcome from these tasks yielded an action plan that, implemented incrementally, could provide a roadmap for CNSF to ensure its IS evolve in step with its operational mission. The action plan is based upon five steps.

CNSF should consider restructuring their current organization in order to facilitate strategic IS decision making. Senior-level commitment is necessary and will set mandates and ensure continued support. They will assist in developing the IS Vision, proper leveraging of IS funding, and serve as a subject-matter-expert for technology requirements. Also, a Commodity Managers Advisory Board (CMAB) would need to be established to serve as an approval panel for technology request that not only impact the operational budget, but also the infrastructure. This group is comprised of diverse experts within the organization that understand either the operational or technical requirements along with their impact on the organization. Changes to the overall leadership structure will enable the organization to better manage their requirements.

CNSF will need to conduct and internal analysis of its spending, mission requirements, and current system and program performance. A spend analysis can provide insight on what items are being purchased, who is being paid, who ordered it, and how much. A performance analysis will examine whether the program is still needed or should it be modified to meet user needs. The performance of the contractor should also be assessed to ensure the command is receiving the highest quality outcome and contractor performance is meeting criteria set-forth in the contract statement of work (SOW). The ability of the ROI's to meet the user's requirements should also be analyzed. If no ROI's exist, then program performance tasks must be determined. Analyze these tasks to discern what performance levels are acceptable. As these tasks are complete, feedback is sent to the leadership to ensure their approval and to increase awareness of the organization's posture. Conducting an internal analysis will increase CNSF's ability to make informed investment decisions.

The organization should conduct assessments on how well current program functions are being performed. The commodity managers will understand the current program and will make assessments as to how it can be done better. They will conduct a study and analysis of alternative systems and capabilities that may provide more efficiency, and require fewer resources. A risk management mitigation assessment will develop an alternative plan for sustaining the organization when a key resource is lost. This plan will serve to minimize the impact of the lost. The contractor assessment will provide feedback on whether a contractor is performing the tasks they were hired to do. As these tasks are complete, feedback is sent back to the leadership for approval and authorization to proceed with needed action. Conducting assessments will offer CNSF the option of capitalizing on new technology that has been researched and vetted by a team of experts.

From the previous step, CNSF will have sound information that will guide them in executing needed tasks. Once the role of IS has been deemed a combat multiplier, CNSF will need to establish an IS funding line for the POM cycle. This will ensure that the IT program will have the funds to evolve in step with the combat systems. Each program needs to have a baseline with version control to support planned growth. Next CNSF will be able to balance spending over requirements with the help of the Commodity Managers Advisory Board. Finally, the command will need to assign accountability to ensure tasks have oversight. As these tasks are complete, feedback is sent to the leadership for approval and endorsement of actions taken. By executing these tasks, CNSF's ability to manage mission changes will be enhanced because it not only meets a user needs, but will also support the organization's strategic goals.

Finally, CNSF will need to manage the resources of time, money, people, and facilities against the requirements of cost, schedule, and performance. Feedback to the leadership will indicate the organization's ability to be successful or the need to reallocate resources. By managing the resources and requirements, CNSF can optimize their decision-making ability.

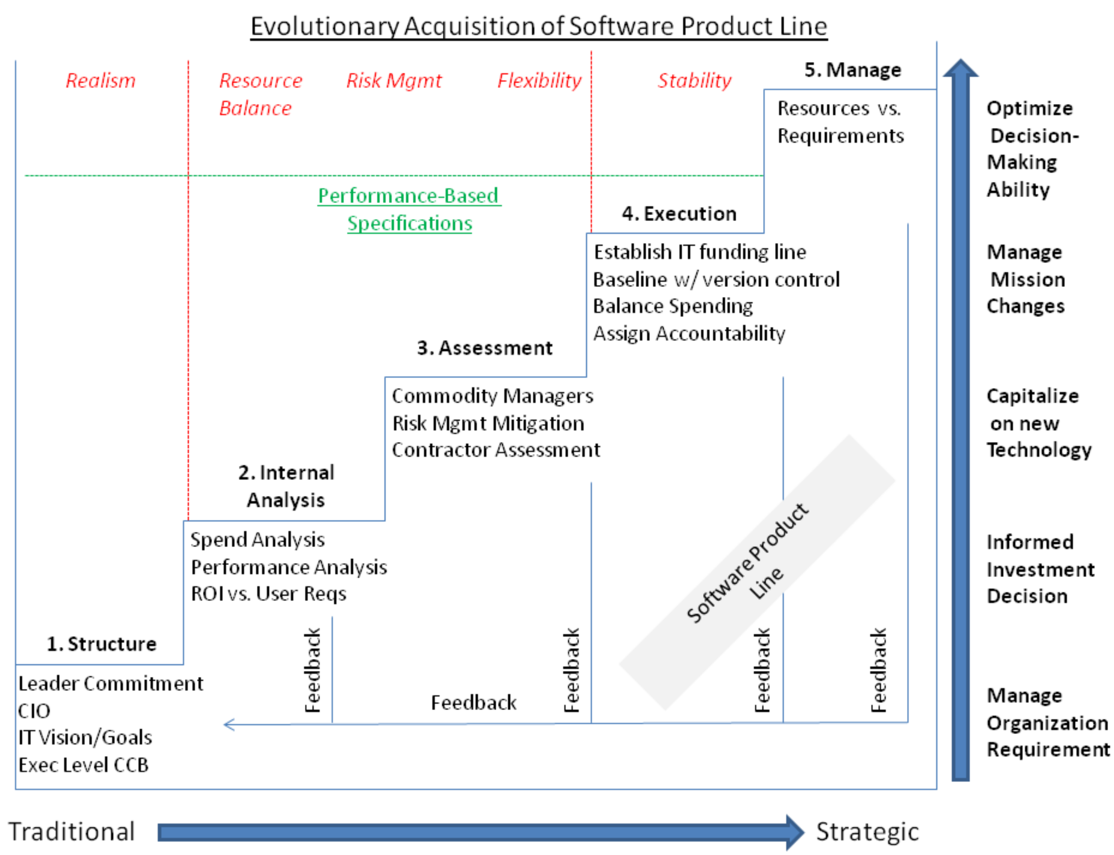

Figure 20. Evolutionary Acquisition of Software Product Line – Acquisition Plan

4. Opportunities for Future Research

Decision making for the acquisition of IS within CNSF requires greater knowledge of what capabilities will provide the greatest return on investment (ROI) for the command. Additionally, the command must identify the most effective method for either cutting or increasing program spending. Therefore, this research should result in a spending analysis, a cost-benefit analysis, and an ROI analysis of CNSF programs to provide better knowledge to the command so that it can make more informed decisions on IS spending.

To execute the analyses recommended by this research we recommend that CNSF utilize both student research and resources within its own command to develop analysis and recommendations to enhance the commands decision-making process so that it may leverage it in future IS acquisition decisions.

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APPENDIX A

Survey Responses- Realism Questions

Custom Data	What significance has the implementation of this program had on the Command's overall mission?	How significant has Command support been to the overall success of this system?	How significant did force-fit measures, that can't be compromised, affect the development or operation of this program?	How important have the role of priority levels, when compared to similar programs, affected decisions made for your particular program?	To what extent were realistic expectations important with regard to this program's scheduling and resource requirements?
	Response	Response	Response	Response	Response
1002	1	1	1	1	1
1012	1	1	2	2	1
cnsf	2	3	4	4	3
1007	1	2	3	3	2
1006	1	1	4	2	2
1009	1	2	3	2	2
1010	1	2	5	4	4
1001	1	1	4	3	2
3	4	1	3	1	2
4	1	1	2	3	1
5	2	1	1	2	1

Survey Responses- Stability Questions

Custom Data	How significant will changes by the user or in capability cause a major disruption of the technical progress needed for the system?	How significant will the changes in policy or leadership affect the direction of this project?	How significant is the impact of having higher level supporters speaking on behalf of your program?	How significant could the use of an IPT improve the success of this program?	How would changes in industry, loss of a major contractor, or failure to modernize impact this program?	How would changes in personnel that cause a lack of accountability or a loss of audit trail affect this program?	How important will it be to operate with objectives, approaches, and control procedures to ensure progress in the program?
	Response	Response	Response	Response	Response	Response	Response
1002	1	1	1	1	1	1	1
1012	4	2	2	5	2	1	1
cnsf	4	3	1	2	1	2	2
1007	4	2	1	3	1	3	2
1006	4	3	1	3	1	1	5
1009	3	1	1	2	1	1	1
1010	5	4	2	4	2	2	3
1001	4	2	1	3	1	2	2
3	2	1	1	3	1	1	1
4	2	3	2	3	1	2	2
5	3	1	1	4	2	2	3

Survey Responses- Resource Balance Questions

Custom Data	How significant have the management of budget for the personnel, facilities, and time affected the successful development or operation of this project?	How important was budgeting from inception to the overall execution of this program?	How important would being part of a continuous funding vehicle affect the financial stability of this project?
	Response	Response	Response
1002	1	1	1
1012	1	2	2
cnsf	2	2	2
1007	2	2	2
1006	2	1	1
1009	2	2	1
1010	2	2	2
1001	2	2	2
3	1	1	1
4	1	3	3
5	1	1	1

Survey Responses - Flexibility Questions

Custom Data	How significant would it be if the user/customer was readily available to answer questions?	How significant would it be if the contract for the program had built in flexibility allowing changes to happen without consultation with the customer?	How important has risk management planning been to maintaining the program schedule?	How much of an impact to the design was attributed to ensuring that the program could support a balance among performance, productivity, and logistics?
	Response	Response	Response	Response
1002	1	1	1	1
1012	3	2	1	2
cnsf	2	2	4	4
1007	3	2	2	3
1006	1	4	3	3
1009	1	2	1	2
1010	3	4	3	2
1001	2	3	2	2
3	1	1	2	1
4	1	2	3	2
5	3	4	2	3

Survey Responses- Risk Management Questions

Custom Data	How significant have uncontrollable requirement shifts affected this program	How significant have the role of natural disasters affected the development or operation of this program?	What significance has funding changes had on the direction of this program?	How significant have government standards affected the development or operation of this program?	How important have changes with the contractor affected the development or operation of this program?
	Response	Response	Response	Response	Response
1002	1	1	3	3	1
1012	1	5	3	2	1
cnsf	3	4	2	2	4
1007	4	4	3	1	2
1006	5	5	1	1	5
1009	2	4	2	2	1
1010	3	5	4	4	1
1001	4	5	3	3	2
3	1	5	1	1	1
4	2	4	4	3	3
5	2	5	2	1	2

Survey Responses- Risk Management Questions

Custom Data	How important are the impacts of external directives that affect the development or operation of the program?	How important has the use of mature technology been to the development or operation of the program?	How important has achieving reliability, availability, and maintainability impact the development or operation of this program?
	Response	Response	Response
1002	1	1	1
1012	2	1	1
cnsf	2	2	3
1007	1	2	2
1006	1	1	1
1009	1	2	2
1010	2	2	1
1001	1	2	1
3	1	1	1
4	2	2	2
5	1	1	2

Survey Responses - Time and Difficulty Questions

Custom Da	How long did it take to implement this program?	Current baseline integration:		Program Certification:		What percentage of success or failure would you rate this program's development or operation?
	Open-Ended Response	How long did it take?	On a scale or 1-7, with 7 being most difficult, how would you rate the difficulty?	How long did it take?	On a scale or 1-7, with 7 being most difficult, how would you rate the difficulty?	Open-Ended Response
1002	2 Years	1 year	4	2 years	5	85% Sucess
1012	Five years, and still developing new usage features	18 months (further details in email)	7	2 years	7	80% success
cnsf	which time? the latest version took several months of testing to feel comfortable in going forward with the upgrade from SharePoint 2003 to SharePoint 2007	see #1.	5	not sure. LANT did the certification since the hardware is housed there.	6	75
1007	2 years for initial implementation - 10 year program total	1 year	5	10 months	6	90% successful
1006	n/a	6mth, to do 80% of Navy; base process and approval process	5	1 yr, ATO was initally painful, once approved learned how to manage it and became easier due to having dedicated people, a process, and a reoccurring window to keep everyone focused	3	100%

Survey Responses - Time and Difficulty
Questions

Custom Da	How long did it take to implement this program?	Current baseline integration:		Program Certification:		What percentage of success or failure would you rate this program's development or operation?
1009	Continiuos implementation	7 Weeks with a few outlying ships	5	Unkown	4	95%
1010	1-2 years	1 year	6	1 year	5	100
1001	About 18 months to introduce TFOM into TORIS and deploy to the Fleet	8 months	4	18 months	6	85% in providing a reliable, web-based data engine to support SURFACE FORCE training and readiness process management
3						100
4	Don't know, TORIS has been implemented since I've been here in 2007. Upgrades to system are generally delayed to fleet.	TBD	6 changes and new demands from users and leadership around the globe continue to slow process of integration.	unknown (I'm an operator, not a developer)	unknown	90. Distance and non-availability of users make problems difficult to solve
5	Depends - 6 months to 6 years	5 years	5	1 year	4	100% success

Survey Responses - Time and Difficulty Questions

Custom Da	On a scale or 1-7, with 7 being most difficult, how would you rate this program’s procurement?	Was this program previously used by other commands?
	Open-Ended Response	Open-Ended Response
1002	4	No
1012	7	No, this program is used only by CVNs
cnsf	4	Yes, and in a different software suite.
1007	3	No
1006	5, it was difficult and frustrating; perfer time-material contract vs cost plus fixed fee	NO, East started with TFOM and it was absorbed into TORIS

Survey Responses - Time and Difficulty Questions

Custom Da	On a scale or 1-7, with 7 being most difficult, how would you rate this program's procurement?	Was this program previously used by other commands?
1009	5	No
1010	5	no
1001	5	no
3		YES
4	unknown (operator only)	at least used by Navy Afloat Training Commands PAC and LANT
5	6 - very difficult to procure	no

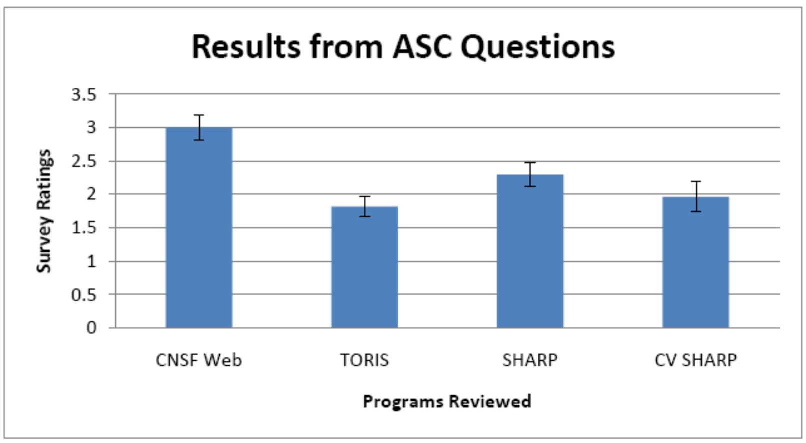
APPENDIX B

Data for Figure 11

	CNSF Web	TORIS	SHARP	CV SHARP
	2	2	1	1
	3	1	2	1
	5	3	3	2
	4	2	3	2
	4	2	2	1
	5	3	4	4
	4	2	2	2
	2	1	1	2
	3	3	3	5
	2	1	1	2
	2	1	3	1
	3	2	2	1
	2	1	2	1
	2	2	2	2
	2	1	2	2
	3	1	3	3
	3	2	2	2
	4	2	2	1
	3	2	3	2
	3	2	4	1
	5	4	4	5
	3	2	3	3
	3	2	1	2
	3	2	2	1
	2	1	1	2
	2	1	2	1
	2	1	2	1
	CNSF Web	TORIS	SHARP	CV SHARP
mean	3	1.814815	2.296296	1.962963
Std error	0.19245	0.151319	0.175532	0.22317

Data for Figure 11

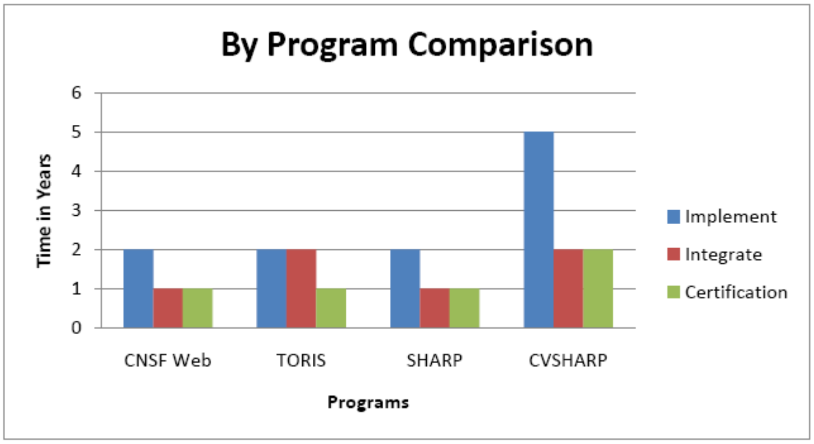
CNSF Web		*TORIS*		*SHARP*		*CV SHARP*	
Mean	3	Mean	1.814815	Mean	2.296296	Mean	1.962963
Standard Error	0.19245009	Standard E	0.151319	Standard E	0.175532	Standard E	0.22317
Median	3	Median	2	Median	2	Median	2
Mode	2	Mode	2	Mode	2	Mode	1
Standard Deviation	1	Standard D	0.786278	Standard D	0.91209	Standard D	1.159625
Sample Variance	1	Sample Var	0.618234	Sample Var	0.831909	Sample Var	1.344729
Kurtosis	-0.37538462	Kurtosis	0.822322	Kurtosis	-0.49482	Kurtosis	1.956855
Skewness	0.74769231	Skewness	0.863193	Skewness	0.332369	Skewness	1.515321
Range	3	Range	3	Range	3	Range	4
Minimum	2	Minimum	1	Minimum	1	Minimum	1
Maximum	5	Maximum	4	Maximum	4	Maximum	5
Sum	81	Sum	49	Sum	62	Sum	53
Count	27	Count	27	Count	27	Count	27



Data - Figure 12

	Time
CNSFWEB	2
	1
	1
TORIS	2
	2
	1
SHARP	2
	1
	1
CVSHARP	5
	2
	2

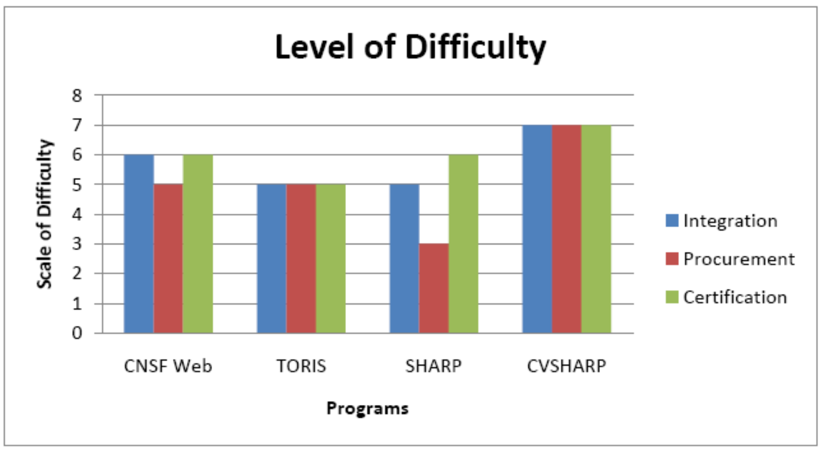
	CNSF Web	TORIS	SHARP	CVSHARP
Implement	2	2	2	5
Integrate	1	2	1	2
Certificatio	1	1	1	2



Data - Figure 13

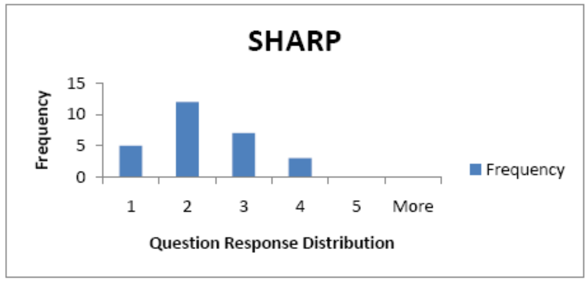
	Likert Scale
CNSFWEB	6
	5
	6
TORIS	5
	5
	5
SHARP	5
	3
	6
CVSHARP	7
	7
	7

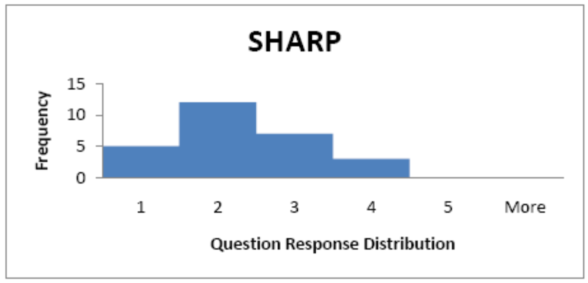
	CNSF Web	TORIS	SHARP	CVSHARP
Integration	6	5	5	7
Procureme	5	5	3	7
Certificatio	6	5	6	7



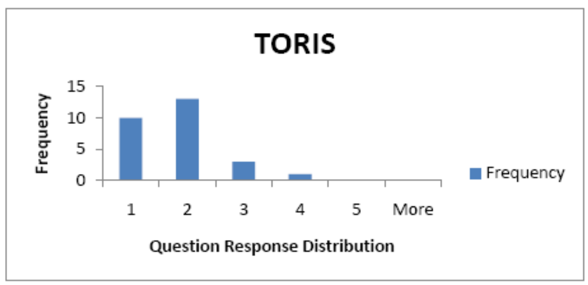
Data - Figure 14

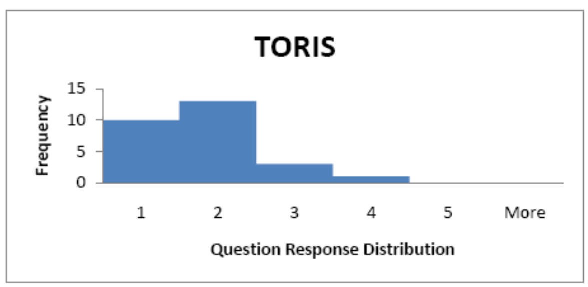
Bin	Frequency
1	5
2	12
3	7
4	3
5	0
More	0





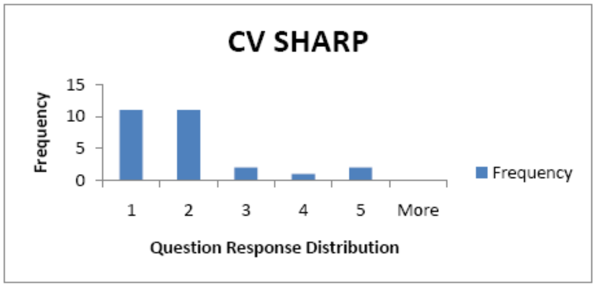
Bin	Frequency
1	10
2	13
3	3
4	1
5	0
More	0

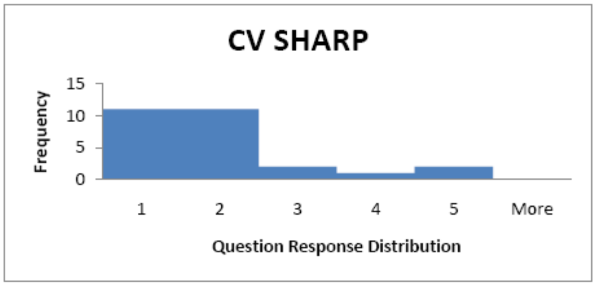




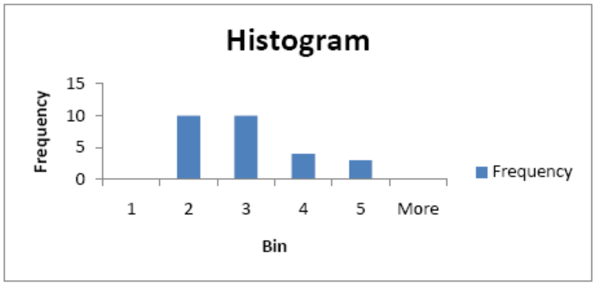
Data - Figure 14

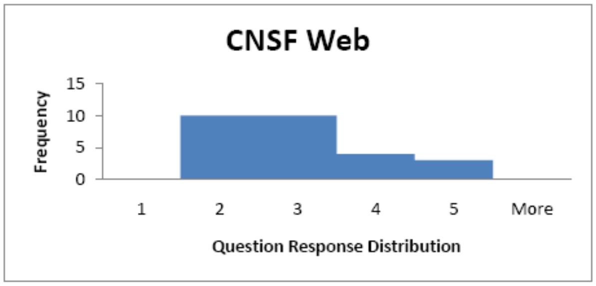
Bin	Frequency
1	11
2	11
3	2
4	1
5	2
More	0





Bin	Frequency
1	0
2	10
3	10
4	4
5	3
More	0





Data- Table 5

	CNSF Web	TORIS	SHARP	CV SHARP
Realism	2	2	1	1
	3	1	2	1
	5	3	3	2
	4	2	3	2
	4	2	2	1
	CNSF Web	TORIS	SHARP	CV SHARP
Stabilty	5	3	4	4
	4	2	2	2
	2	1	1	2
	3	3	3	5
	2	1	1	2
	2	1	3	1
	3	2	2	1
	CNSF Web	TORIS	SHARP	CV SHARP
Resource B	2	1	2	1
	2	2	2	2
	2	1	2	2
	CNSF Web	TORIS	SHARP	CV SHARP
Flexibilty	3	1	3	3
	3	2	2	2
	4	2	2	1
	3	2	3	2
	CNSF Web	TORIS	SHARP	CV SHARP
Risk Mngt	3	2	4	1
	5	4	4	5
	3	2	3	3
	3	2	1	2
	3	2	2	1
	2	1	1	2
	2	1	2	1
	2	1	2	1

Table 5. Mean (Std, Dev)

Variable	CNSF Web	TORIS	SHARP	CV SHARP
Realism	3.6(1.1)	2(.7)	2.2(.8)	1.4(.5)
Stability	3(1.2)	1.9(.9)	2.3(1.1)	2.4(1.5)
Resource Balance	2(0)	1.3(.6)	2(0)	1.7(.6)
Flexibility	3.3(.5)	1.8(.5)	2.5(.6)	2(.8)
Risk Management	2.9(1)	1.9(1)	2.4(1.2)	2(1.4)

Variable	CNSF Web	TORIS	SHARP	CV SHARP
Realism	3.6(1.1)	2(.7)	2.2(.8)	1.4(.5)
Stability	3(1.2)	1.9(.9)	2.3(1.1)	2.4(1.5)
Resource Balance	2(0)	1.3(.6)	2(0)	1.7(.6)
Flexibility	3.3(.5)	1.8(.5)	2.5(.6)	2(.8)
Risk Management	2.9(1)	1.9(1)	2.4(1.2)	2(1.4)

Realism

CNSF Web		TORIS		SHARP		CV SHARP	
Mean	3.6	Mean	2	Mean	2.2	Mean	1.4
Standard Error	0.509902	Standard E	0.316228	Standard E	0.374166	Standard E	0.244949
Median	4	Median	2	Median	2	Median	1
Mode	4	Mode	2	Mode	2	Mode	1
Standard Deviation	1.140175	Standard D	0.707107	Standard D	0.83666	Standard D	0.547723
Sample Variance	1.3	Sample Var	0.5	Sample Var	0.7	Sample Var	0.3
Kurtosis	-0.17751	Kurtosis	2	Kurtosis	-0.612245	Kurtosis	-3.333333
Skewness	-0.4048	Skewness	0	Skewness	-0.512241	Skewness	0.608581
Range	3	Range	2	Range	2	Range	1
Minimum	2	Minimum	1	Minimum	1	Minimum	1
Maximum	5	Maximum	3	Maximum	3	Maximum	2
Sum	18	Sum	10	Sum	11	Sum	7
Count	5	Count	5	Count	5	Count	5

Stability

CNSF Web		TORIS		SHARP		CV SHARP	
Mean	3	Mean	1.857143	Mean	2.285714	Mean	2.428571
Standard Error	0.436436	Standard E	0.340068	Standard E	0.42056	Standard E	0.571429
Median	3	Median	2	Median	2	Median	2
Mode	2	Mode	1	Mode	2	Mode	2
Standard Deviation	1.154701	Standard D	0.899735	Standard D	1.112697	Standard D	1.511858
Sample Variance	1.333333	Sample Var	0.809524	Sample Var	1.238095	Sample Var	2.285714
Kurtosis	-0.15	Kurtosis	-1.816609	Kurtosis	-0.944379	Kurtosis	-0.196875
Skewness	0.909327	Skewness	0.353045	Skewness	0.248875	Skewness	1.000425
Range	3	Range	2	Range	3	Range	4
Minimum	2	Minimum	1	Minimum	1	Minimum	1
Maximum	5	Maximum	3	Maximum	4	Maximum	5
Sum	21	Sum	13	Sum	16	Sum	17
Count	7	Count	7	Count	7	Count	7

Resource Balance

CNSF Web		TORIS		SHARP		CV SHARP	
Mean	2	Mean	1.333333	Mean	2	Mean	1.666667
Standard Error	0	Standard E	0.333333	Standard E	0	Standard E	0.333333
Median	2	Median	1	Median	2	Median	2
Mode	2	Mode	1	Mode	2	Mode	2
Standard Deviation	0	Standard D	0.57735	Standard D	0	Standard D	0.57735
Sample Variance	0	Sample Var	0.333333	Sample Var	0	Sample Var	0.333333
Kurtosis	#DIV/0!	Kurtosis	#DIV/0!	Kurtosis	#DIV/0!	Kurtosis	#DIV/0!
Skewness	#DIV/0!	Skewness	1.732051	Skewness	#DIV/0!	Skewness	-1.732051
Range	0	Range	1	Range	0	Range	1
Minimum	2	Minimum	1	Minimum	2	Minimum	1
Maximum	2	Maximum	2	Maximum	2	Maximum	2
Sum	6	Sum	4	Sum	6	Sum	5
Count	3	Count	3	Count	3	Count	3

Data- Table 5

Flexibility

CNSF Web		*TORIS*		*SHARP*		*CV SHARP*	
Mean	3.25	Mean	1.75	Mean	2.5	Mean	2
Standard E	0.25	Standard Error	0.25	Standard Errc	0.28867513	Standard Errc	0.40824829
Median	3	Median	2	Median	2.5	Median	2
Mode	3	Mode	2	Mode	3	Mode	2
Standard D	0.5	Standard Deviation	0.5	Standard Dev	0.57735027	Standard Dev	0.81649658
Sample Var	0.25	Sample Variance	0.25	Sample Varia	0.33333333	Sample Varia	0.66666667
Kurtosis	4	Kurtosis	4	Kurtosis	-6	Kurtosis	1.5
Skewness	2	Skewness	-2	Skewness	0	Skewness	0
Range	1	Range	1	Range	1	Range	2
Minimum	3	Minimum	1	Minimum	2	Minimum	1
Maximum	4	Maximum	2	Maximum	3	Maximum	3
Sum	13	Sum	7	Sum	10	Sum	8
Count	4	Count	4	Count	4	Count	4

Risk Management

CNSF Web		*TORIS*		*SHARP*		*CV SHARP*	
Mean	2.875	Mean	1.875	Mean	2.375	Mean	2
Standard E	0.350382	Standard Error	0.35038244	Standard Errc	0.41992771	Standard Errc	0.5
Median	3	Median	2	Median	2	Median	1.5
Mode	3	Mode	2	Mode	2	Mode	1
Standard D	0.991031	Standard Deviation	0.99103121	Standard Dev	1.18773494	Standard Dev	1.41421356
Sample Var	0.982143	Sample Variance	0.98214286	Sample Varia	1.41071429	Sample Varia	2
Kurtosis	2.973091	Kurtosis	2.97309091	Kurtosis	-1.2292902	Kurtosis	2.47142857
Skewness	1.486055	Skewness	1.48605539	Skewness	0.39432572	Skewness	1.61624407
Range	3	Range	3	Range	3	Range	4
Minimum	2	Minimum	1	Minimum	1	Minimum	1
Maximum	5	Maximum	4	Maximum	4	Maximum	5
Sum	23	Sum	15	Sum	19	Sum	16
Count	8	Count	8	Count	8	Count	8

Data - Figure 15

	CNSF Web	Rank-web	TORIS	Rank-TORIS	SHARP	Rank- SHARP	CV SHARP	Rank-CVSHARP
Realism	2	16.5	2	16.6	1	6.5	1	6.5
	3	27	1	6.5	2	16.5	1	6.5
	5	46	3	37	3	37	2	16.5
	4	34.5	2	16.5	3	27	2	16.5
	4	34.5	2	16.5	2	16.5	1	6.5
	T1 =	158.5	T2 =	93.1	T3 =	103.5	T4 =	52.5
Stabilty	5	5.5	3	3.5	4	4.5	4	4.5
	4	4.5	2	2.5	2	2.5	2	2.5
	2	2.5	1	1.5	1	1.5	2	2.5
	3	3.5	3	3.5	3	3.5	5	5.5
	2	2.5	1	1.5	1	1.5	2	2.5
	2	2.5	1	1.5	3	3.5	1	1.5
	3	3.5	2	2.5	2	2.5	1	1.5
	T1 =	24.5	T2 =	16.5	T3 =	19.5	T4 =	20.5
Resource B	2	2.5	1	1.5	2	2.5	1	1.5
	2	2.5	2	2.5	2	2.5	2	2.5
	2	2.5	1	1.5	2	2.5	2	2.5
	T1 =	7.5	T2 =	5.5	T3 =	7.5	T4 =	6.5
Flexibilty	3	3.5	1	1.5	3	3.5	3	3.5
	3	3.5	2	2.5	2	2.5	2	2.5
	4	4	2	2.5	2	2.5	1	1.5
	3	3.5	2	2.5	3	3.5	2	2.5
	T1 =	14.5	T2 =	9	T3=	12	T4 =	10
Risk Mngt	3	3.5	2	2.5	4	4.5	1	1.5
	5	5.5	4	4.5	4	4.5	5	5.5
	3	3.5	2	2.5	3	3.5	3	3.5
	3	3.5	2	2.5	1	1.5	2	2.5
	3	3.5	2	2.5	2	2.5	1	1.5
	2	2.5	1	1.5	1	1.5	2	2.5
	2	2.5	1	1.5	2	2.5	1	1.5
	2	2.5	1	1.5	2	2.5	1	1.5
	T1 =	27	T2 =	19	T3 =	23	T4 =	20

Data - Figure 15

Realism	CNSF Web	TORIS	SHARP	CV SHARP
	16.5	16.6	6.5	6.5
	27	6.5	16.5	6.5
	46	37	37	16.5
	34.5	16.5	27	16.5
	34.5	16.5	16.5	6.5
	158.5	93.1	103.5	52.5

Kruskal-Wallis Test		
Group	Rank Sum	Observations
CNSF Web	76.5	5
TORIS	52.5	5
SHARP	54	5
CV SHARP	27	5
H Stat		7.02
df		3
p-value		0.0713
chi-squared Critical		7.8147

Resources	CNSF	TORIS	SHARP	CV SHARP
	2.5	1.5	2.5	1.5
	2.5	2.5	2.5	2.5
	2.5	1.5	2.5	2.5

Kruskal-Wallis Test		
Group	Rank Sum	Observations
CNSF	24	3
TORIS	12	3
SHARP	24	3
CV SHARP	18	3
H Stat		2.5385
df		3
p-value		0.4684
chi-squared Critical		7.8147

Risk	CNSF	TORIS	SHARP	CV Sharp
	3.5	2.5	4.5	1.5
	5.5	4.5	4.5	5.5
	3.5	2.5	3.5	3.5
	3.5	2.5	1.5	2.5
	3.5	2.5	2.5	1.5
	2.5	1.5	1.5	2.5
	2.5	1.5	2.5	1.5
	2.5	1.5	2.5	1.5

Kruskal-Wallis Test		
Group	Rank Sum	Observations
CNSF	176	8
TORIS	106	8
SHARP	139	8
CV Sharp	107	8
H Stat		4.6676
df		3
p-value		0.1978
chi-squared Critical		7.8147

Data - Figure 15

Stabilty	CNSF	TORIS	SHARP	CV SHARP
	5.5	3.5	4.5	4.5
	4.5	2.5	2.5	2.5
	2.5	1.5	1.5	2.5
	3.5	3.5	3.5	5.5
	2.5	1.5	1.5	2.5
	2.5	1.5	3.5	1.5
	3.5	2.5	2.5	1.5

Kruskal-Wallis Test		
Group	Rank Sum	Observations
CNSF	131	7
TORIS	78	7
SHARP	99	7
CV SHARP	98	7
H Stat		3.0422
df		3
p-value		0.3852
chi-squared Critical		7.8147

Flexibility	CNSF	TORIS	SHARP	CV SHARP
	3.5	1.5	3.5	3.5
	3.5	2.5	2.5	2.5
	4	2.5	2.5	1.5
	3.5	2.5	3.5	2.5

Kruskal-Wallis Test		
Group	Rank Sum	Observations
CNSF	53.5	4
TORIS	19.5	4
SHARP	37	4
CV SHARP	26	4
H Stat		7.318
df		3
p-value		0.0624
chi-squared Critical		7.8147

Data - Figure 16

	Realism
CNSFWEB	2
	3
	5
	4
	4
TORIS	2
	1
	3
	2
	2
SHARP	1
	2
	3
	3
	2
CVSHARP	1
	1
	2
	2
	1

CNSFWeb	TORIS
2	2
3	1
5	3
4	2
4	2

TORIS	SHARP
2	1
1	2
3	3
2	3
2	2

CNSFWeb	SHARP
2	1
3	2
5	3
4	3
4	2

TORIS	CVSHARP
2	1
1	1
3	2
2	2
2	1

CNSFWeb	CVSHARP
2	1
3	1
5	2
4	2
4	1

SHARP	CVSHARP
1	1
2	1
3	2
3	2
2	1

Realism	
CNSFWEB	TORIS
CNSFWEB	SHARP
CNSFWEB	CVSHARP
TORIS	SHARP
TORIS	CVSHARP
SHARP	CVSHARP

Data - Figure 16

Wilcoxon Rank Sum Test

	Rank Sum	Observations
CNSFWeb	37	5
TORIS	18	5
z Stat	1.9845	
P(Z<=z) one-tail	0.0236	
z Critical one-tail	1.2816	
P(Z<=z) two-tail	0.0472	
z Critical two-tail	1.6449	

Wilcoxon Rank Sum Test

	Rank Sum	Observations
CNSFWEB	36	5
SHARP	19	5
z Stat	1.7756	
P(Z<=z) one-tail	0.0379	
z Critical one-tail	1.2816	
P(Z<=z) two-tail	0.0758	
z Critical two-tail	1.6449	

Wilcoxon Rank Sum Test

	Rank Sum	Observations
TORIS	33.5	5
CVSHARP	21.5	5
z Stat	1.2534	
P(Z<=z) one-tail	0.105	
z Critical one-tail	1.2816	
P(Z<=z) two-tail	0.21	
z Critical two-tail	1.6449	

Wilcoxon Rank Sum Test

	Rank Sum	Observations
SHARP	34.5	5
CVSHARP	20.5	5
z Stat	1.4623	
P(Z<=z) one-tail	0.0718	
z Critical one-tail	1.2816	
P(Z<=z) two-tail	0.1436	
z Critical two-tail	1.6449	

Wilcoxon Rank Sum Test

	Rank Sum	Observations
TORIS	25.5	5
SHARP	29.5	5
z Stat	-0.4178	
P(Z<=z) one-tail	0.3381	
z Critical one-tail	1.2816	
P(Z<=z) two-tail	0.6762	
z Critical two-tail	1.6449	

Wilcoxon Rank Sum Test

	Rank Sum	Observations
CNSFWEB	39	5
CVSHARP	16	5
z Stat	2.4023	
P(Z<=z) one-tail	0.0081	
z Critical one-tail	1.2816	
P(Z<=z) two-tail	0.0162	
z Critical two-tail	1.6449	

Data - Figure 17

	Flexiblity
CNSFWEB	3
	3
	4
	3
TORIS	1
	2
	2
	2
SHARP	3
	2
	2
	3
CVSHARP	3
	2
	1
	2

Flexibiltiy

CNSFWEB	TORIS
3	1
3	2
4	2
3	2

TORIS	SHARP
1	3
2	2
2	2
2	3

CNSFWEB	SHARP
3	3
3	2
4	2
3	3

TORIS	CVSHARP
1	3
2	2
2	1
2	2

CNSFWEB	CVSHARP
3	3
3	2
4	1
3	2

SHARP	CVSHARP
3	3
2	2
2	1
3	2

Flexibilty

CNSFWEB	TORIS
CNSFWEB	SHARP
CNSFWEB	CVSHARP
TORIS	SHARP
TORIS	CVSHARP
SHARP	CVSHARP

Data - Figure 17

Wilcoxon Rank Sum Test

	Rank Sum	Observations
CNSFWEB	26	4
TORIS	10	4
z Stat	2.3094	
P(Z<=z) one-tail	0.0105	
z Critical one-tail	1.2816	
P(Z<=z) two-tail	0.021	
z Critical two-tail	1.6449	

Wilcoxon Rank Sum Test

	Rank Sum	Observations
CNSFWEB	23	4
SHARP	13	4
z Stat	1.4434	
P(Z<=z) one-tail	0.0745	
z Critical one-tail	1.2816	
P(Z<=z) two-tail	0.149	
z Critical two-tail	1.6449	

Wilcoxon Rank Sum Test

	Rank Sum	Observations
TORIS	13	4
SHARP	23	4
z Stat	-1.4434	
P(Z<=z) one-tail	0.0745	
z Critical one-tail	1.2816	
P(Z<=z) two-tail	0.149	
z Critical two-tail	1.6449	

Wilcoxon Rank Sum Test

	Rank Sum	Observations
TORIS	16.5	4
CVSHARP	19.5	4
z Stat	-0.433	
P(Z<=z) one-tail	0.3325	
z Critical one-tail	1.2816	
P(Z<=z) two-tail	0.665	
z Critical two-tail	1.6449	

Wilcoxon Rank Sum Test

	Rank Sum	Observations
CNSFWEB	24.5	4
CVSHARP	11.5	4
z Stat	1.8764	
P(Z<=z) one-tail	0.0303	
z Critical one-tail	1.2816	
P(Z<=z) two-tail	0.0606	
z Critical two-tail	1.6449	

Wilcoxon Rank Sum Test

	Rank Sum	Observations
SHARP	21	4
CVSHARP	15	4
z Stat	0.866	
P(Z<=z) one-tail	0.1932	
z Critical one-tail	1.2816	
P(Z<=z) two-tail	0.3864	
z Critical two-tail	1.6449	

Realism Data - Table 6

	Realism	Realism
CNSFWEB	2	2
	3	3
	5	5
	4	4
	4	4
TORIS	2	2
	1	1
	3	3
	2	2
	2	2
SHARP	1	1
	2	2
	3	3
	3	3
	2	2
CVSHARP	1	1
	1	1
	2	2
	2	2
	1	1

Spearman Rank Correlation

Realism and Realism	
Spearman Rank Correlation	1
z Stat	4.3589
P(Z<=z) one tail	0
z Critical one tail	1.2816
P(Z<=z) two tail	0
z Critical two tail	1.6449

	Stability	Realism
CNSFWEB	5	2
	4	3
	2	5
	3	4
	2	4
	2	2
	3	1
TORIS	3	3
	2	2
	1	2
	3	1
	1	2
	1	3
	2	3
SHARP	4	2
	2	1
	1	1
	3	2
	1	2
	3	1
	2	
CVSHARP	4	
	2	
	2	

Spearman Rank Correlation

Stability and Realism	
Spearman Rank Correlation	-0.0069
z Stat	-0.0302
P(Z<=z) one tail	0.488
z Critical one tail	1.2816
P(Z<=z) two tail	0.976
z Critical two tail	1.6449

Realism Data - Table 6

	Realism	Realism
CNSFWEB	2	2
	3	3
	5	5
	4	4
	4	4
TORIS	2	2
	1	1
	3	3
	2	2
	2	2
SHARP	1	1
	2	2
	3	3
	3	3
	2	2
CVSHARP	1	1
	1	1
	2	2
	2	2
	1	1

Spearman Rank Correlation

Realism and Realism	
Spearman Rank Correlation	1
z Stat	4.3589
P(Z<=z) one tail	0
z Critical one tail	1.2816
P(Z<=z) two tail	0
z Critical two tail	1.6449

	Stability	Realism
CNSFWEB	5	2
	4	3
	2	5
	3	4
	2	4
	2	2
	3	1
TORIS	3	3
	2	2
	1	2
	3	1
	1	2
	1	3
	2	3
SHARP	4	2
	2	1
	1	1
	3	2
	1	2
	3	1
	2	
CVSHARP	4	
	2	
	2	

Spearman Rank Correlation

Stability and Realism	
Spearman Rank Correlation	-0.0069
z Stat	-0.0302
P(Z<=z) one tail	0.488
z Critical one tail	1.2816
P(Z<=z) two tail	0.976
z Critical two tail	1.6449

Realism Data - Table 6

5
2
1
1

	Resource B	Realism
CNSFWEB	2	2
	2	3
	2	5
TORIS	1	4
	2	4
	1	2
SHARP	2	1
	2	3
	2	2
CVSHARP	1	2
	2	1
	2	2
		3
		3
		2
		1
		1
		2
		2
		1

Spearman Rank Correlation

Resource Balance and Realism	
Spearman Rank Correlation	-0.0581
z Stat	-0.1928
P(Z<=z) one tail	0.4236
z Critical one tail	1.2816
P(Z<=z) two tail	0.8472
z Critical two tail	1.6449

	Flexiblity	Realism
CNSFWEB	3	2
	3	3
	4	5
	3	4
TORIS	1	4
	2	2
	2	1
	2	3
SHARP	3	2
	2	2
	2	1
	3	2
CVSHARP	3	3
	2	3
	1	2
	2	1
		1
		2

Spearman Rank Correlation

Flexiblity and Realism	
Spearman Rank Correlation	0.3155
z Stat	1.2218
P(Z<=z) one tail	0.1109
z Critical one tail	1.2816
P(Z<=z) two tail	0.2218
z Critical two tail	1.6449

Realism Data - Table 6

		2
		1
	Risk Manag	Realism
CNSFWEB	3	2
	5	3
	3	5
	3	4
	3	4
	2	2
	2	1
	2	3
TORIS	2	2
	4	2
	2	1
	2	2
	2	3
	1	3
	1	2
	1	1
SHARP	4	1
	4	2
	3	2
	1	1
	2	
	1	
	2	
	2	
CVSHARP	1	
	5	
	3	
	2	
	1	
	2	
	1	
	1	

Spearman Rank Correlation

Risk Management and Realism	
Spearman Rank Correlation	0.2713
z Stat	1.1826
P(Z<=z) one tail	0.1185
z Critical one tail	1.2816
P(Z<=z) two tail	0.237
z Critical two tail	1.6449

Stability Data - Table 6

	Realism	Stability
CNSFWEB	2	5
	3	4
	5	2
	4	3
	4	2
TORIS	2	2
	1	3
	3	3
	2	2
	2	1
SHARP	1	3
	2	1
	3	1
	3	2
	2	4
CVSHARP	1	2
	1	1
	2	3
	2	1
	1	3
		2
		4
		2
		2
		5
		2
		1
		1

Spearman Rank Correlation

Realism and Stability	
Spearman Rank Correlation	-0.0069
z Stat	-0.0302
P(Z<=z) one tail	0.488
z Critical one tail	1.2816
P(Z<=z) two tail	0.976
z Critical two tail	1.6449

	Stability	Stability
CNSFWEB	5	5
	4	4
	2	2
	3	3
	2	2
	2	2
	3	3
TORIS	3	3
	2	2
	1	1
	3	3
	1	1
	1	1
	2	2
SHARP	4	4
	2	2

Spearman Rank Correlation

Stability and Stability	
Spearman Rank Correlation	1
z Stat	5.1962
P(Z<=z) one tail	0
z Critical one tail	1.2816
P(Z<=z) two tail	0
z Critical two tail	1.6449

Stability Data - Table 6

	1	1
	3	3
	1	1
	3	3
	2	2
CVSHARP	4	4
	2	2
	2	2
	5	5
	2	2
	1	1
	1	1

	Resource B	Stability
CNSFWEB	2	5
	2	4
	2	2
TORIS	1	3
	2	2
	1	2
SHARP	2	3
	2	3
	2	2
CVSHARP	1	1
	2	3
	2	1
		1
		2
		4
		2
		1
		3
		1
		3
		2
		4
		2
		2
		5
		2
		1
		1

Spearman Rank Correlation

Resource Balance and Stability	
Spearman Rank Correlation	0.2896
z Stat	0.9604
P(Z<=z) one tail	0.1684
z Critical one tail	1.2816
P(Z<=z) two tail	0.3368
z Critical two tail	1.6449

	Flexiblity	Stability
CNSFWEB	3	5
	3	4

Spearman Rank Correlation

Flexiblity and Stability

Stability Data - Table 6

	4	2
	3	3
TORIS	1	2
	2	2
	2	3
	2	3
SHARP	3	2
	2	1
	2	3
	3	1
CVSHARP	3	1
	2	2
	1	4
	2	2
		1
		3
		1
		3
		2
		4
		2
		2
		5
		2
		1
		1

Spearman Rank Correlation	-0.0928
z Stat	-0.3595
P(Z<=z) one tail	0.3596
z Critical one tail	1.2816
P(Z<=z) two tail	0.7192
z Critical two tail	1.6449

	Risk Manag	Stability
CNSFWEB	3	5
	5	4
	3	2
	3	3
	3	2
	2	2
	2	3
	2	3
TORIS	2	2
	4	1
	2	3

Spearman Rank Correlation

Risk Management and Stability

Spearman Rank Correlation	-0.249
z Stat	-1.2937
P(Z<=z) one tail	0.0979
z Critical one tail	1.2816
P(Z<=z) two tail	0.1958
z Critical two tail	1.6449

Stability Data - Table 6

	2	1
	2	1
	1	2
	1	4
	1	2
SHARP	4	1
	4	3
	3	1
	1	3
	2	2
	1	4
	2	2
	2	2
CVSHARP	1	5
	5	2
	3	1
	2	1
	1	
	2	
	1	
	1	

Flexibility Data - Table 6

	Realism	Flexiblity
CNSFWEB	2	3
	3	3
	5	4
	4	3
	4	1
TORIS	2	2
	1	2
	3	2
	2	3
	2	2
SHARP	1	2
	2	3
	3	3
	3	2
	2	1
CVSHARP	1	2
	1	
	2	
	2	
	1	

Spearman Rank Correlation

Realism and Flexiblity	
Spearman Rank Correlation	0.3155
z Stat	1.2218
P(Z<=z) one tail	0.1109
z Critical one tail	1.2816
P(Z<=z) two tail	0.2218
z Critical two tail	1.6449

	Stability	Flexiblity
CNSFWEB	5	3
	4	3
	2	4
	3	3
	2	1
	2	2
	3	2
TORIS	3	2
	2	3
	1	2
	3	2
	1	3
	1	3
	2	2
SHARP	4	1
	2	2
	1	
	3	
	1	
	3	
	2	
CVSHARP	4	
	2	
	2	

Spearman Rank Correlation

Stability and Flexiblity	
Spearman Rank Correlation	-0.0928
z Stat	-0.3595
P(Z<=z) one tail	0.3596
z Critical one tail	1.2816
P(Z<=z) two tail	0.7192
z Critical two tail	1.6449

Flexibility Data - Table 6

5
2
1
1

	Resource B	Flexiblity
CNSFWEB	2	3
	2	3
	2	4
TORIS	1	3
	2	1
	1	2
SHARP	2	2
	2	2
	2	3
CVSHARP	1	2
	2	2
	2	3
		3
		2
		1
		2

Spearman Rank Correlation

Resource Balance and Flexiblity	
Spearman Rank Correlation	0.1503
z Stat	0.4984
P(Z<=z) one tail	0.3091
z Critical one tail	1.2816
P(Z<=z) two tail	0.6182
z Critical two tail	1.6449

	Flexiblity	Flexiblity
CNSFWEB	3	3
	3	3
	4	4
	3	3
TORIS	1	1
	2	2
	2	2
	2	2
SHARP	3	3
	2	2
	2	2
	3	3
CVSHARP	3	3
	2	2
	1	1
	2	2

Spearman Rank Correlation

Flexiblity and Flexiblity	
Spearman Rank Correlation	1
z Stat	3.873
P(Z<=z) one tail	0.0001
z Critical one tail	1.2816
P(Z<=z) two tail	0.0002
z Critical two tail	1.6449

	Risk Manag	Flexiblity
CNSFWEB	3	3
	5	3
	3	4

Spearman Rank Correlation

Risk Management and Flexiblity	
Spearman Rank Correlation	0.4099

Flexibility Data - Table 6

	3	3	z Stat	1.5876
	3	1	P(Z<=z) one tail	0.0562
	2	2	z Critical one tail	1.2816
	2	2	P(Z<=z) two tail	0.1124
	2	2	z Critical two tail	1.6449
TORIS	2	3		
	4	2		
	2	2		
	2	3		
	2	3		
	1	2		
	1	1		
	1	2		
SHARP	4			
	4			
	3			
	1			
	2			
	1			
	2			
	2			
CVSHARP	1			
	5			
	3			
	2			
	1			
	2			
	1			
	1			

Resource Balance Data- Table 6

	Realism	Resource Balance
CNSFWEB	2	2
	3	2
	5	2
	4	1
	4	2
TORIS	2	1
	1	2
	3	2
	2	2
	2	1
SHARP	1	2
	2	2
	3	
	3	
	2	
CVSHARP	1	
	1	
	2	
	2	
	1	

Spearman Rank Correlation

Realism and Resource Balance	
Spearman Rank Correlation	-0.0581
z Stat	-0.1928
P(Z<=z) one tail	0.4236
z Critical one tail	1.2816
P(Z<=z) two tail	0.8472
z Critical two tail	1.6449

	Stability	Resource Balance
CNSFWEB	5	2
	4	2
	2	2
	3	1
	2	2
	2	1
	3	2
TORIS	3	2
	2	2
	1	1
	3	2
	1	2
	1	
	2	
SHARP	4	
	2	
	1	
	3	
	1	
	3	
	2	
CVSHARP	4	
	2	
	2	

Spearman Rank Correlation

Stability and Resource Balance	
Spearman Rank Correlation	0.2896
z Stat	0.9604
P(Z<=z) one tail	0.1684
z Critical one tail	1.2816
P(Z<=z) two tail	0.3368
z Critical two tail	1.6449

Resource Balance Data- Table 6

5
2
1
1

	Resource B	Resource Balance
CNSFWEB	2	2
	2	2
	2	2
TORIS	1	1
	2	2
	1	1
SHARP	2	2
	2	2
	2	2
CVSHARP	1	1
	2	2
	2	2

Spearman Rank Correlation

Resource Balance and Resource Balance	
Spearman Rank Correlation	1
z Stat	3.3166
P(Z<=z) one tail	0.0005
z Critical one tail	1.2816
P(Z<=z) two tail	0.001
z Critical two tail	1.6449

	Flexiblity	Resource Balance
CNSFWEB	3	2
	3	2
	4	2
	3	1
TORIS	1	2
	2	1
	2	2
	2	2
SHARP	3	2
	2	1
	2	2
	3	2
CVSHARP	3	
	2	
	1	
	2	

Spearman Rank Correlation

Flexiblity and Resource Balance	
Spearman Rank Correlation	0.1503
z Stat	0.4984
P(Z<=z) one tail	0.3091
z Critical one tail	1.2816
P(Z<=z) two tail	0.6182
z Critical two tail	1.6449

	Risk Manag	Resource Balance
CNSFWEB	3	2
	5	2
	3	2
	3	1
	3	2
	2	1

Spearman Rank Correlation

Risk Management and Resource Balance	
Spearman Rank Correlation	-0.2126
z Stat	-0.705
P(Z<=z) one tail	0.2404
z Critical one tail	1.2816

Resource Balance Data- Table 6

	2	2	P(Z<=z) two tail	0.4808
	2	2	z Critical two tail	1.6449
TORIS	2	2		
	4	1		
	2	2		
	2	2		
	2			
	1			
	1			
	1			
SHARP	4			
	4			
	3			
	1			
	2			
	1			
	2			
	2			
CVSHARP	1			
	5			
	3			
	2			
	1			
	2			
	1			
	1			

Risk Management Data - Table 6

	Realism	Risk Management
CNSFWEB	2	3
	3	5
	5	3
	4	3
	4	3
TORIS	2	2
	1	2
	3	2
	2	2
	2	4
SHARP	1	2
	2	2
	3	2
	3	1
	2	1
CVSHARP	1	1
	1	4
	2	4
	2	3
	1	1
		2
		1
		2
		2
		1
		5
		3
		2
		1
		2
		1
		1

Spearman Rank Correlation

Realism and Risk Management	
Spearman Rank Correlation	0.2713
z Stat	1.1826
P(Z<=z) one tail	0.1185
z Critical one tail	1.2816
P(Z<=z) two tail	0.237
z Critical two tail	1.6449

	Stability	Risk Management
CNSFWEB	5	3
	4	5
	2	3
	3	3
	2	3
	2	2
	3	2
TORIS	3	2
	2	2
	1	4
	3	2
	1	2
	1	2

Spearman Rank Correlation

Stability and Risk Management	
Spearman Rank Correlation	-0.249
z Stat	-1.2937
P(Z<=z) one tail	0.0979
z Critical one tail	1.2816
P(Z<=z) two tail	0.1958
z Critical two tail	1.6449

Risk Management Data - Table 6

	2	1
SHARP	4	1
	2	1
	1	4
	3	4
	1	3
	3	1
	2	2
CVSHARP	4	1
	2	2
	2	2
	5	1
	2	5
	1	3
	1	2
		1
		2
		1
		1

	Resource B	Risk Management
CNSFWEB	2	3
	2	5
	2	3
TORIS	1	3
	2	3
	1	2
SHARP	2	2
	2	2
	2	2
CVSHARP	1	4
	2	2
	2	2
		2
		1
		1
		1
		4
		4
		3

Spearman Rank Correlation

Resource Balance and Risk Management	
Spearman Rank Correlation	-0.2126
z Stat	-0.705
P(Z<=z) one tail	0.2404
z Critical one tail	1.2816
P(Z<=z) two tail	0.4808
z Critical two tail	1.6449

Risk Management Data - Table 6

		1		
		2		
		1		
		2		
		2		
		1		
		5		
		3		
		2		
		1		
		2		
		1		
		1		
	Flexiblity	Risk Management	**Spearman Rank Correlation**	
CNSFWEB	3	3		
	3	5	*Flexiblity and Risk Management*	
	4	3	Spearman Rank Correlation	0.4099
	3	3	z Stat	1.5876
TORIS	1	3	P(Z<=z) one tail	0.0562
	2	2	z Critical one tail	1.2816
	2	2	P(Z<=z) two tail	0.1124
	2	2	z Critical two tail	1.6449
SHARP	3	2		
	2	4		
	2	2		
	3	2		
CVSHARP	3	2		
	2	1		
	1	1		
	2	1		
		4		
		4		
		3		
		1		
		2		
		1		
		2		
		2		
		1		
		5		
		3		
		2		
		1		
		2		
		1		
		1		

Risk Management Data - Table 6

	Risk Manag	Risk Management
CNSFWEB	3	3
	5	5
	3	3
	3	3
	3	3
	2	2
	2	2
	2	2
TORIS	2	2
	4	4
	2	2
	2	2
	2	2
	1	1
	1	1
	1	1
SHARP	4	4
	4	4
	3	3
	1	1
	2	2
	1	1
	2	2
	2	2
CVSHARP	1	1
	5	5
	3	3
	2	2
	1	1
	2	2
	1	1
	1	1

Spearman Rank Correlation

Risk Management and Risk Management	
Spearman Rank Correlation	1
z Stat	5.5678
P(Z<=z) one tail	0
z Critical one tail	1.2816
P(Z<=z) two tail	0
z Critical two tail	1.6449

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APPENDIX C

The information within this appendix is original analysis of the GAO's case study of six commercial organizations that sought to move from a traditional to strategic approach on IS acquisition decision making. The analysis reviews the four concepts recommended by the GAO and discusses the lessons learned from the study. The analysis was used to provide a background of recommendations to be provided to Commander, Naval Surface Forces in its transformation toward strategic IS acquisition decision making.

GAO Case Study

Title:

Adopting a Strategic Approach for service acquisitions will leverage your resources and reduce your operating costs

Abstract:

The government Accountability Office (GAO) conducted a study of six companies from the commercial industry in order to capture lessons learned on how they evolved from traditional to strategic service acquisitions. Strategic decision making was based upon four concepts:

- Commitment
- Knowledge
- Change
- Support

Any change effort must have top-level leader support. Commitment to any change or initiative should have upper-management support and be pushed down through the various echelons of the organization. The organization must have detailed knowledge of their core values and processes in order to facilitate effective decision making. A company should perform a detailed spend analysis in order to gain necessary knowledge and become proactive in decision making vice reactive. Third, an organization must create the structure, processes, and roles for strategic decision making. To meet the goals of this principle, an organization must look to experts in the commodities they are hoping to procure. Ultimately, for these changes to remain in place there must be sustained leader support, open communication channels, and credible metrics for process utilization and compliance. By embracing these four concepts, the organizations in this study were able to better leverage their resources, reduce their operating costs, better manage their service providers, and gain better quality from services rendered.

Background:

This case study shows how companies in the commercial industry improved their business processes and saved money by adopting a strategic approach for service acquisitions. The GAO conducted this study as a result of growing concern about federal agency spending. The GAO studied six companies to determine what lessons learned could be drawn from their experiences. This study demonstrates how to overcome traditional business practices and reap the benefits of strategic decision making.

Hypothesis:

A Strategic or Enterprise approach to service acquisitions could better leverage resource dollars and reduce operational costs.

Inquiry Questions that support the hypothesis:

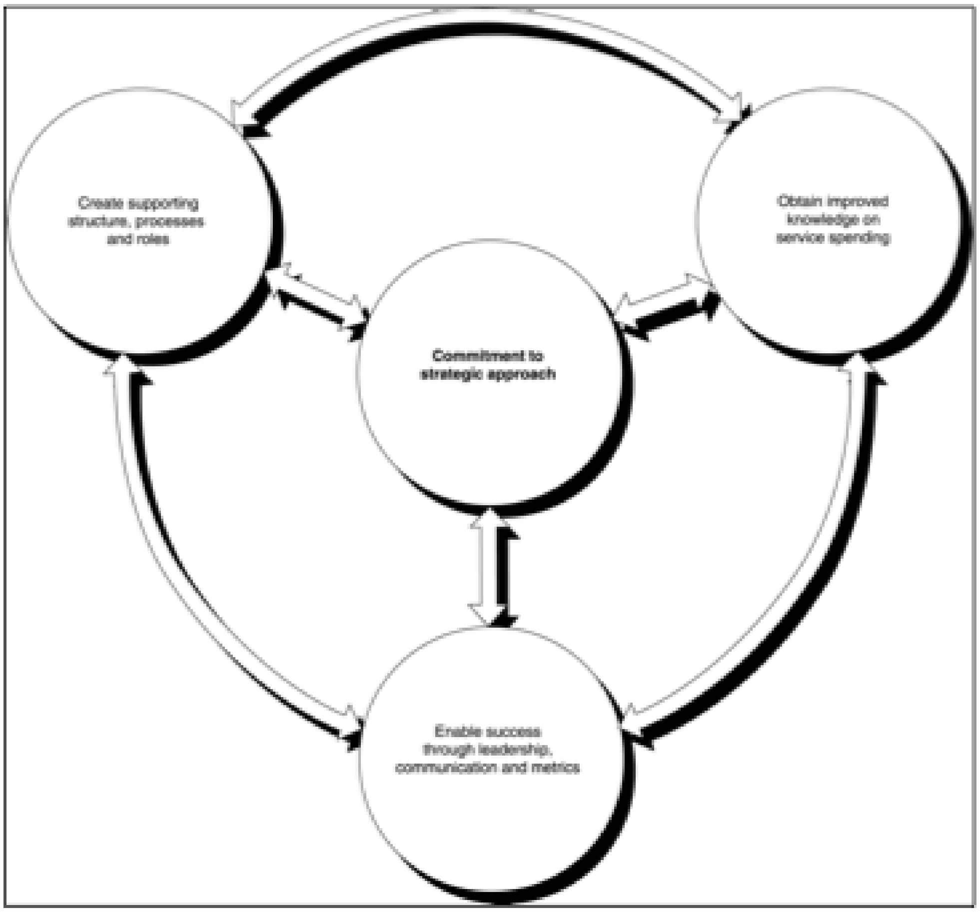
- Why must you secure Up-front Commitment from top leaders?
- What are the benefits for obtaining better knowledge on service spending?
- How can an organization improve its service acquisition decisions, which are applicable across the organization, by creating enterprise structure, processes, and supporting roles?
- How can an organization improve service acquisition decision making through sustained leaderships, communication, and metrics?

Methodology/Results:

Overview of the GAO Study

The companies in this study realized that they did not have control of money flows when acquiring services. Additionally, decision making for the acquisition of services was left to individual units like finance, engineering, manufacturing, human resources, and maintenance, without top-level intervention, or expert evaluation. This separation of decision making hurt any chance the company had of making a coordinated decision across the organization. They also lacked the tools to measure the services' ability to meet company needs.

To reverse these trends, companies realized there was a need to reengineer their approach to services acquisition. To accomplish this company leadership would have to change their top-down decision-making process, to be more enterprise-centric. This would involve Raising commitment for a shared strategy In order to better leverage their buying power, and better manage service providers these companies developed systems to provide credible, reliable, and timely data on acquired services. Finally, the organization needed to develop creative ways of doing business. The following figure shows the four key elements of a Strategic Approach. The arrows indicate the complementary nature of each concept.



The GAO recognized that civilian companies have many of the same requirements for service support as DoD components. Their needs range from complex services such as advertising and information management, to simple services like waste removal and lawn care. Although they are not restricted by the same regulatory guidelines as the government, there is still some added benefit in understanding how they are able to improve their processes and procedures.

The six companies examined in this study were chosen based upon the following criteria:

- Literary research
- University recommendations
- industry associations
- Research organizations
- Other Industry experts

The following table lists the six organizations and their functions:

Company	Function
Brunswick Corporation	A leader in the boating, marine engine, fitness equipment, bowling, and billiards industries.
The Dun & Bradstreet Corporation	A leading provider of business credit, marketing and purchasing information, and receivables management services.
Electronic Data Systems (EDS) Corporation	A leader in the information technology services industry, providing business and government clients high-value consulting, electronic business solutions, business process management and systems, and technology expertise.
Exxon Mobil Corporation	The world's largest integrated oil company, ranking first in profits, proven reserves, liquids production, natural gas production, oil production, and refining capacity.
Hasbro, Inc.	A leader in the design, manufacture, and marketing of toys and games, ranging from traditional to high-tech.
Merrill Lynch & Co., Inc.	A leading provider of investment, financing, advisory, insurance, and related products and services, ranking first in U.S. and global debt and equity underwriting.

Table 1. Company Profiles

The goals of their reengineering effort were to "leverage their buying power, reduce cost, better manage their service providers, and improve the quality of services provided." Four general principles emerged as the most critical for achieving a strategic approach to purchasing services. They are listed below. All of the companies did not follow the principles exactly, but they used some variation of them. They all achieved the same result of "substantial" savings and service improvements.

Commitment...*Secure up front commitment from top leaders*

- Recognize and communicate the urgency to change service spending practices
- Provide clear and strong executive leadership, including goals and targets

Knowledge...*Obtain improved knowledge on service spending*

- Develop information system to identify how much is being spent with which service provider for what services
- Analyze the data to identify opportunities to reduce costs, improve service levels, and provide better management of service providers

Change...*Create supporting structure, processes, and roles*

- Create or identify organizations responsible for coordinating or managing service purchases
- Establish proactive business relationships between end users, purchasing units, and other stakeholders
- Implement more integrated team-based sourcing processes
- Create commodity/service experts

Support...*Enable success through sustained leadership, communication, and metrics*

- Obtain sustaining support from senior leadership to facilitate change
- Establish clear lines of communication between all affected parties
- Demonstrate value and credibility of new processes through use of metrics

Table 2. Guiding Principles

Securing Upfront Support from Top Leaders

Senior leadership involvement from the beginning was paramount. The leaders provided direction, vision, and supervised the development of a common process approach. In some cases the leaders associated their name to new ventures in order to secure buy-in.

The shift from a traditional to strategic decision-making approach required active participation from senior leaders. For example, traditionally, services belonged to one business section, while strategically they are viewed centrally. Examining how change occurs; traditional managers are not active participants. But, strategically, they provide direction and vision, by providing goals, targets, and feedback on achieving them.

It is important to have senior leaders spearheading reengineering efforts because they have the authority to direct others to support, the responsibility to set corporate agenda, and the power to remove barriers that block change. Previous research has documented that the failure of reengineering efforts are largely attributed to the lack of top management commitment.

Obtain Better Knowledge on Service Spending

The companies involved in the study conducted a spend analysis to answer two questions:

- How much was being spent for services?
- Where were the dollars going?

The analysis revealed that they were buying similar services from numerous providers, and at many times varying prices. To make strategic decisions, they would have to develop a deliberate approach to planning and managing their acquisitions.

Several ideas emerged from the comparison of the two approaches. First, traditional management focused on components and material, which did not assist in spending management. The strategic approach focused on developing credible, reliable, and timely data on services acquired. Secondly, data has traditionally been used as an after-the-fact reporting tool. In a strategic sense, data is used to find opportunities that will rationalize the supplier base and reduce costs.

The initial step in determining spending trends is a spend analysis. A spend analysis should identify the following:

- What types of services are being acquired?
- How many suppliers for a specific service the company is using?
- How much they are spending for that service, in total and with each supplier?
- Which units within the company are purchasing the services?

In the table below, four of the six companies shared how they capitalized on information learned from their spend analysis:

Company	What the spend analysis revealed	What the company did with this knowledge
Hasbro	Hasbro's spend analysis revealed that it had 17 providers of temporary administrative, clerical, and light industrial personnel for 7 locations. The company also found that it had inconsistent policies and processes, multiple contact points, and limited performance measures and that information was not being shared across locations.	Hasbro consolidated its temporary personnel supplier base to a single provider, reduced the number of oversight personnel, established a formal communication program, and had the contractor assume responsibility for developing consistent policies and processes. Further, by leveraging its buying power, Hasbro negotiated an overhead rate that was 45 percent lower than previously obtained and reduced its total spending on temporary labor from $5 million to $4.3 million. A Hasbro official told us its efforts often resulted in savings ranging from 15 percent to 45 percent and improved service levels.
Brunswick	Brunswick conducted a spend analysis to determine the types of telecommunication services its business units acquired, monthly usage rates, and cost data to help it define its requirements and establish a negotiating position. It found its seven business units had three different telecommunication providers.	Following a competition in which six potential suppliers participated, Brunswick awarded a contract to a single supplier. Company officials told us their negotiated per minute usage rates were about 60 percent less than the average of its prior rates, saving Brunswick $3.2 million in the first 8 months of the new contract.
Dun & Bradstreet	Dun & Bradstreet's spend analysis showed that the company employed hundreds of providers of temporary labor. While Dun & Bradstreet originally planned to reduce the supplier base to a single provider, its market research found that no one company could meet its needs.	Dun & Bradstreet revised its acquisition strategy to designate a preferred supplier that would receive 70 percent of its business and the contract with a limited number of second tier suppliers that would provide personnel with specialized skills or provide labor to areas not served by the preferred supplier. Company officials told us this strategy enabled them to acquire more actual labor per dollar since the preferred supplier agreed to charge a lower profit and overhead rate than it had previously done when it had a smaller portion of Dun & Bradstreet's business.
EDS	Prior to implementing its centralized process for procuring information technology services, a spend analysis revealed that EDS had more than 3,000 "unleveraged" suppliers.	EDS initially conducted a strategic sourcing exercise to better define its needs and establish a more manageable number of suppliers and instituted various interim process changes. EDS' long-term solution was to develop an integrated, web-based, financial and management information system capable of systematically matching its business managers' needs with potential service providers; capturing spending, wage, and overhead data by skill set and supplier; assessing supplier performance; and performing various financial management and accounting tasks. EDS officials told us that it has reduced its supplier base to 14 national suppliers, 6 regional suppliers, and a small set of providers of personnel with specialized skills, and it typically negotiates overhead rates that are at least one-third less than the industry average." EDS officials estimated they had saved more than $210 million over the past 5 years by pursuing a more strategic approach to purchasing information technology services.

Table 3. Spend Analysis Results

<u>Create Structure, Processes, and Roles to Support Enterprise Perspective</u>

To achieve an enterprise perspective, the companies revamped their procedures for acquiring services in terms of their structure, processes, and roles. Their current fragmented approach hindered their ability to coordinate across their organizations. They made three major changes:

- Elevated and/or expanded the role of the company's procurement organization.
- Established cross-functional teams with a mix of knowledge, expertise, and credibility.
- Established dedicated commodity managers to oversee key services.

The companies successfully performed in a proactive advisory role to their subordinates, instead of just being relied upon for resourcing. The role of purchasing in their organization changed, and those changes are shown in the following table:

Traditional	Strategic
Independent, local organizations with limited visibility over the company's total service spending.	Central/matrixed organizations responsible for coordinating or managing service purchases.
Reactive support role to business units.	Proactive business relationships.
Limited coordination between business and purchasing units and other functions such as legal or finance.	Procurement process based on cross-functional teams.
Buyers.	Commodity/service experts.

Table 5. Traditional v. Strategic

Elevating Procurement Organization

Procurement Organizations often reside deep within their business unit, attributing to the fragmented approach to acquiring services. The procurement organizations were restructured with elevated roles and given greater responsibility and authority. This new organization is able to assist with strategic planning, management, and oversight for the organization's service spending. In the following table, Brunswick and EDS had informal, decentralized, independent procurement organizations, while ExxonMobil had none at all. All three found a way to employ this realignment to gain improved coordination and the optimization of resources.

Company	How the companies restructured their procurement organization
Brunswick	Historically, Brunswick had allowed its business units to operate fairly independently, with the corporation acting more like a holding company. According to Brunswick officials, this decentralized structure inhibited its ability to conduct an enterprisewide assessment of its procurement processes and effectiveness. Brunswick's new chief executive officer believed a more coordinated and cooperative approach would help rationalize Brunswick's supplier base and leverage the company's buying power. Consequently, Brunswick established a corporate procurement organization to provide strategic planning for and policy and guidance to its business units and elevated the role of procurement to the vice-presidential level within its corporate structure.
ExxonMobil	Senior corporate leadership took the opportunity presented by the 1999 merger of Exxon and Mobil to develop a procurement organization that would provide the company's 11 business units a competitive advantage by fully optimizing their supply chain through strategic sourcing of key services and gain operating cost efficiencies through a fully integrated procurement and payment process. The president of ExxonMobil's global services company reports directly to an executive vice president.
EDS	EDS employed an informal, decentralized system for obtaining the services of programmers, systems analysts, and other information technology professionals employed on a temporary or contract basis. This system provided managers in the field almost complete authority, but it provided EDS management with only limited visibility over the costs, performance, and value of the services acquired. In the mid-1990s, EDS faced increasing expenditures for labor services needed to meet its client needs. Additionally, in 1998, the chairman challenged the company to reduce its costs by $1 billion and looked for the corporate procurement organization to contribute significantly to this goal. While the procurement organization previously had been two to three layers from the chief executive officer, the new procurement organization now reports directly to the chief financial officer. Additionally, EDS established a separate unit specifically responsible for developing, managing, and executing a comprehensive sourcing and supply process for acquiring information technology professionals, which EDS officials estimated represented approximately one-third of the services it acquired.

Table 6. Examples of re-structuring

Establishing Cross-Functional Procurement Process

Of the six companies in this study, two established Cross-Functional Procurement Processes to help with identifying requirements, and for evaluating potential service providers. The teams consisted of individuals from each business unit in order to ensure the right mix of knowledge, technical expertise, and credibility. The representatives came from various sectors like the company's purchasing unit, internal clients, users of the service, and the budget office. The individuals not only worked to ensure that their own requirements were met, but to also assist in achieving the overall organizations requirements. Their tasks included the analysis of spending data, prioritizing identified opportunities, defining internal requirements, and conducting market research. Using this approach, the companies were better able to define their requirements, manage service providers, and meet the user's needs at the lowest possible cost to the company.

In the following table, ExxonMobil created a detailed sourcing handbook that was both practical and flexible for everyone to follow. It not only provided guidelines and procedures, it also provided tools, templates, and checklists for sourcing activities. They used a four-phase, data-driven procurement process:

- Opportunity identification
- Strategy development and execution
- Supplier selection
- Relationship management

This process integrated their sourcing strategy into their business units' annual and long term planning cycles. Taking a different approach, Hasbro used the team-based approach to identify annual opportunities for detailed supplier reviews and ultimate supplier selections. This team will evaluated the potential suppliers, conducted negotiations, selected the suppliers, and monitored them for future planning cycle feedback.

Company	How the companies use their cross-functional procurement process
ExxonMobil	ExxonMobil, the largest company we visited, established a formal procurement process. ExxonMobil officials noted their processes are detailed in a sourcing handbook that is intended to be both practical and flexible enough to provide the basis and support for innovative sourcing strategies. The handbook provides both general guidelines and specific procedures and includes a suite of tools, templates, and checklists needed to effectively conduct sourcing activities. ExxonMobil uses a four-phase, data-driven procurement process (opportunity identification, strategy development, strategy execution and supplier selection, and relationship management) that involves close interaction with the procurement function, internal clients, and suppliers. Sourcing strategy development is integrated within the business units' annual and long term planning cycles to ensure that the strategies, priorities, and cost reduction objectives are fully aligned.
Hasbro	Hasbro begins its procurement process almost a year in advance, using a team-based approach to identify 12 to 15 opportunities each year for a more comprehensive review. According to a Hasbro official, about 30 people—representatives from purchasing, finance, logistics, and affected business units—participate in this exercise and consider, among other things, Hasbro's total spending for that service, the significance of the service relative to Hasbro's principal product lines, and market conditions. Once these opportunities are identified, smaller cross-functional teams are formed to conduct more in-depth analyses. These teams initially focused their activities on identifying Hasbro's requirements and conducting market research; however, the teams subsequently obtained and evaluated information from potential suppliers, conducted negotiations, and finally selected the suppliers. A team member is generally designated to monitor the supplier, in part, as a means to provide feedback into the planning cycle.

Table 7. Cross-Functional Procurement Processes

Establishing Dedicated Commodity Managers

Three of the six companies established a full-time dedicated commodity manager to preside over key services. These services are either of high value or have a significant impact on company's operations. ExxonMobil established eight commodity managers to oversee material and services. Some of their services included information technology, advertising, and drilling services. Brunswick established five commodity managers to coordinate service purchases and to serve as change agents to improve their procurement processes. Merrill Lynch's commodity managers will work to define requirements with internal clients, negotiate with potential service providers, and will assist in resolving issues after a contract has been awarded.

Enable Success through Sustained Leadership, Communication, and Metrics

Resistance, cultural barriers, and many other impediments hindered the companies' reengineering efforts. Three critical elements for overcoming these challenges were identified, they are:

- Sustained leadership
- Communication
- Measurement

The following table compares decision making under the traditional philosophy to the strategic philosophy.

Table 8: Characteristics Promoting Successful Strategic Reengineering Efforts

Traditional	Strategic
Corporate leaders not actively engaged in improving service acquisitions.	Senior leaders actively reinforce commitment to achieve change.
Business units and purchasing organizations do not clearly communicate or cooperate.	Clear lines of communication between all affected parties.
Performance measures did not exist.	Performance measures used to demonstrate value and credibility of new processes.

Source: GAO analysis.

Sustained Leadership

In many cases, senior leadership will offer their support in the initial stages of a new idea for change in service acquisitions. But, this type of effort is long-term and the leaders need to provide continuous support. They may even need to provide their clout in an effort to push for acceptance of reengineering efforts.

Communication

Communication lines between business units and purchasing organizations are often nonexistent. This type of separation hinders the communication of requirements and solutions to problems. As reengineering teams work to bridge this gap, they must be clear in communicating their goals, rationale, and expected results if they hope to obtain buy-in and avoid unanticipated pitfalls. An additional success factor for reengineering teams is to be open minded to the needs of those affected by change, and be willing to alter their plans. Opening up lines of communications can potentially yield several benefits:

- Timely delivery of needed services
- Hiring of better skilled and trained consultants
- Reduce costs
- Provide an alternative solution to meet requirements

Metrics

Metrics often help with decision making because it provides credibility. The following is a list that shows how metrics can be used:

- Evaluate and understand an organizations performance level
- Identify critical processes for management attention and focus
- Assist in obtaining knowledge for setting realistic improvement goals
- Document results over time

Metrics are often used to measure financial performances like total cost savings and cost avoidances. In this study, Dun & Bradstreet measured savings in their procurement process. At the beginning of the year, their senior management sets the target for procurements. Throughout the year, they conduct reviews to show their progress.

In some cases, metrics are used to determine if internal processes are working to the user's satisfaction. When companies extended the role of their procurement function, they used metrics to measure quality, timeliness, and how valuable the service was to the business unit. ExxonMobil shared employment of their extensive three-tier system to measure enhanced procurement functions. The top tier had eight metrics that were used to assess the company's ability to meet financial, customer satisfaction, and business operation objectives. The second tier measures performance monitoring and internal/external benchmarking. The third tier measured local site level daily operational activities. The company developed multiple metrics to bring credibility to their results. This is important to keep in mind when developing metrics because they help to prevent disagreements over numbers which could ultimately undermine the value of the process itself.

Finally, some of the companies used metrics to measure compliance of a new process. It is important to know if new processes are being used because of the anticipated cost savings. In this study, EDS measured the degree to which the new procurement process was used in acquiring information technology systems. If their business units would meet the target goal by using the new system 70 to 80 percent of the time, then the company would save an estimated $26 million.

Analysis:

The data presented in this case study clearly show the benefits of using a strategic approach for service acquisitions. Four pillars of support were presented and the resulting data showed how they achieved success. The four pillars for the strategic approach are leader commitment, spend analysis, a supporting structure, and open lines of communication.

It is important to secure Up-front Commitment from top leaders because they will serve as your champions. They will have access to the resources needed for success. Additionally, leaders want to be a part of change and if you can prove that you have a worthy project, then you can secure leader support.

Having knowledge about how much is spent on services could help guide future decisions. The study demonstrated how cost saving could come from analyzing the data. This analysis could provide insight into who pays for service, who receives the service, and who provides the service. You could save money by streamlining the providers and possibly negotiate better prices.

Enterprise concepts require supporting structures, processes, and key roles. The structure must allow integration of different systems. It would be helpful to establish a relationship between the users, purchasing units, and stakeholders. Another critical idea is the establishment of commodity leaders. This person could serve multiple roles. They could help define requirements, intervene on stalled contract negotiations, and a host of other tasks.

Acquisition decision making can occur due to sustained leadership, communication, and metrics. It shined a light on not only the fact that senior leaders must be a part of any change, but that they must be the one directing the change. They can set goals and objectives for everyone to follow. They can open closed doors. The need for clear lines of communication between sections was also an area of focus. This study also shows the values in having credible metrics. Metrics can measure the effectiveness of processes, guide resourcing decisions, and provide feedback on performance.

Conclusion:

The study presented actionable evidence from commercial companies who took on tasks of change and were rewarded. In some cases, they provided explicit details on how they reengineered their processes and reorganized their people in an effort to achieve a strategic approach. Once they were able to make coordinated decisions across their organization, they were able to leverage resources and reduce their operating costs.

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